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A STUDY OF SELECTED LANDFILLS DESIGNED AS PESTICIDE DISPOSAL SITES

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TRW Systems Group

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A STUDY OF SELECTED LANDFILLS DESIGNED AS PESTICIDE DISPOSAL SITES

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PREFACE AND ACKNOWLEDGEMENTS

This report presents the results of an in-depth study of historical, environmental, political, social, economic, and institutional aspects of selected landfills used for the disposal of pesticide waste. The study was conducted by TRW Systems under Contract BOA 68-01-2956, Task Order 68-01-3204, for the EPA Office of Solid Waste Management Programs, Hazardous Waste Management Division. The Project is deeply indebted to the EPA Project Officer, Mr. Harry Day, for his continuing advice and guidance during the course of the study. Thanks are also due to other staff members of the Office of Solid Waste Management Programs for their critical review of the draft final report.

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This report presents the results of an in-depth study of historical, environmental, political, social, economic, and institutional aspects of selected landfills used for the disposal of pesticide waste. Information from the ten sites studied indicate that while there are similarities in certain features of the establishment and operation of some of the sites, the landfills also differ in a number of respects. The similarities and differences reflect the similarities and differences between applicable state regulations, local waste disposal needs, and cost factors. At the present time in many areas of the country there is a great need for the establishment of pesticide disposal sites or the development of alternative disposal methods. This report which presents the results is intended to serve as an information transfer publication, making available to pesticide disposal site planners and other interested parties the experience gained at the operating sites.

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TABLE OF CONTENTS

Page

PREFACE AND ACKNOWLEDGEMENTS iii

LIST OF TABLES vi

LIST OF FIGURES vii

I. SUMMARY 1

II. CONCLUSIONS 7

III. INTRODUCTION AND OBJECTIVES OF THE STUDY 10

IV. METHODOLOGY 12

V. CASE STUDIES 15

- Case Study No. 1 - Big Blue Hills Disposal Site, Coalinga, California 16
- Case Study No. 2 - Agriculture Chemical Container Disposal Sites, State of Nevada 23
- Case Study No. 3 - Simi Sanitary Landfill, Simi Valley, California 36
- Case Study No. 4 - Wes-Con, Inc., Titan Site, Owyhee County, Idaho 44
- Case Study No. 5 - Imperial County Pesticide Container Disposal Sites, Imperial County, California 58
- Case Study No. 6 - Powersville Sanitary Landfill, Powersville, Georgia 72
- Case Study No. 7 - Concrete Culverts for Pesticide Waste Encapsulation in Sanitary Landfills, State of Mississippi 78
- Case Study No. 8 - Wheeling Disposal Site, Andrew County, Missouri 87
- Case Study No. 9 - Browning-Ferris Industries Landfill, Darrow, Louisiana 92
- Case Study No. 10 - Des Moines Metropolitan Area Solid Waste Agency (Metro) Sanitary Landfill, Polk County, Iowa 97

VI. DISCUSSION 105

VII. REFERENCES 111

TABLE OF CONTENTS (CONT'D)

Page

VIII. APPENDICES 112

Appendix A (Abbreviations for Units of Weight and Measure). 113

Appendix B (California Disposal Site and Waste Classification Systems). 115

Appendix C (For Case Study No. 1) 119

Appendix D (For Case Study No. 3) 124

LIST OF TABLES

Table No.		Page
1	Landfill Sites and Sources of Data for the Case Studies . . .	13
2	Characteristics of the Disposal Sites and Approximate Number of Users	25
3	Agencies Involved and Their Responsibilities	28
4	Pesticide Containers Handled at the Disposal Sites	30
5	Public Information Bulletin on Site Operation	33
6	Member Agencies in VRCSD	38
7	Monthly Total Waste Quantities Handled at the Wes-Con Site (August 1974 to August 1975)	49
8	Pesticide Disposal Site Operating Schedule	65
9	Area, Capacity, Depth to Fill, and Estimated Life Expectancy of Sanitary Landfills	71
10	Governmental Jurisdictions or Political Units which Comprise Des Moines Metropolitan Area Solid Waste Agency	98
11	Hazardous Waste Characterization Data Request Form	101
12	Summary of Pertinent Features of the Ten Landfill Sites . . .	106

LIST OF FIGURES

Figure No.		Page
1	Vicinity Map for the Big Blue Hills Disposal Site	17
2	Lovelock Disposal Site	26
3	Vicinity Map for the Simi Valley Sanitary Landfill	37
4	Vicinity Map for the Wes-Con Site	45
5	Photographs of the Wes-Con Disposal Facility	47
6	Certificate of Disposal Issued for Wastes Accepted at the Wes-Con Site	50
7	Assumption of Risk and Release from Liability Form Signed by Individuals Entering the Wes-Con Site	54
8	County of Imperial Solid Waste Disposal Sites	59
9	Calexico Disposal Site	63
10	The Operating Disposal Trench at Calexico and Imperial Sites	67
11	Waste Disposal Trench and Gate, Lock and Danger Signs for the Hazardous Waste Disposal Section of the Powersville Sanitary Landfill	74
12	Installation of Concrete Culvert Containers and Actual Deposition of Waste in a Container	80
13	Metal Frame Support and the Cover and Lock System for Concrete Culvert Containers	81
14	"Pitch In" Containers for Waste Collection and Environmental Park Developed on Recovered Land from a Sanitary Landfill Operation	86
15	Site Development Plan for Wheeling Disposal Site	89

I. SUMMARY

Under a contract with the EPA Office of Solid Waste Management Programs, Hazardous Waste Management Division, TRW undertook a study of the historical, environmental, political, social, economic and institutional aspects of establishment and operation of 10 landfills used for pesticide disposal. This report which presents the results is intended to serve as **an information transfer** publication, making available to pesticide disposal site planners and other interested parties the experience gained at the operating sites.

The selection of the 10 sites was based on considerations of design and/or use of the site for pesticide waste disposal, extent of cooperation offered by the sites contacted, amount of data available, representation of spectra of geographic locations, waste processing/disposal methods, site characteristics, and type of the operating agencies. The data collection involved visits to the sites and contacts with appropriate governmental agencies.

The data collected in this study on the 10 landfill sites indicate that while there are similarities in certain features of the establishment and operation of some of the sites, the landfills also differ in a number of respects. The similarities and differences reflect the similarities and differences between applicable state regulations, local waste disposal needs and cost factors. At the present time in many areas of the country there is a great need for establishment of pesticide disposal sites or the development of alternate disposal methods.

The data collected in the study are presented and discussed in this report as 10 individual case studies.

Case Study No. 1. Big Blue Hills Disposal Site, Coalinga, California. The site is a California Class I site established in 1973 by the Fresno County Department of Public Works for the disposal of unrinsed pesticide containers from the agricultural industry in Fresno and adjacent counties. The site is open four weeks per year. The site operates under a permit from the State Regional Water Quality Control Board. The site development cost was $12,711, paid for from the county's general funds. The operating cost ($5,000 to $10,000 per year) is paid for in part by a gate fee of $2.29/m^3 ($1.75/yd^3)* and in part by county general funds. Wastes are taken to the site by commercial haulers and waste generators. Each waste load is accompanied by a California Liquid Waste Hauler Record. Waste disposal is by the trench method. The operating area is fenced off. The site was selected after an environmental impact study. An explosion in 1974 damaged landfill equipment. The estimated site life is 20 years.

Case Study No. 2. Agricultural Chemical Container Disposal Sites, Nevada. These are four sites for the disposal of empty and rinsed pesticide containers. The sites were constructed in 1971 at a cost of $5,800 to $7,500 per site. Two sites are on Bureau of Land Management property, and two are on county land. Eighty percent of the construction costs were assumed by the Agricultural Stabilization and Conservation Service and 20 percent by users. There is no charge for use of the sites. Major impetuses for the development of the sites were dumping on BLM land and incidents of poisoning with pesticide residue in containers. Only empty pesticide containers are accepted at the sites. Each site is open six to seven days per year. Two of the sites are operated by farmers cooperative organizations, one site by a rancher, and one site by a farm product distributor. Waste disposal is by the trench method and containers are crushed on site prior to disposal. The anticipated life of each site is about 10 years. Three times a year, samples of air, soil, vegetation, wildlife, and water from the surrounding area are collected and analyzed. One problem with the operation of the site which is being corrected through public education relates to containers left outside or thrown over the fence when the sites are not open.

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* See Appendix A for the abbreviations used in this report for units of weight and measure.

Case Study No. 3. Simi Sanitary Landfill, Simi Valley, California. Established in 1970, this is a sanitary landfill containing a California Class I site, a section of which is used for the disposal of pesticide containers which originate mainly from agricultural uses within the county. The site is operated by the Ventura Regional County Sanitation District (VRCSD) under a permit from the State Regional Water Quality Control Board. VRCSD has as its member agencies the Ventura County and nine cities and 14 special districts within the county. The initial capital investment for the entire site ($431,000) was paid for by funds from member agencies. The operating cost is about $3.30/t ($3.00/ton) of waste, about 1/3 of which is paid for from a tax base and 2/3 from the gate fee. About 64 t (70 tons) per year of pesticide containers are handled at the site. Up until recently, pesticide containers were only accepted on Wednesdays. This coupled with a relatively high gate fee and the requirements for detailed waste documentation had resulted in the use of other sites by potential customers. To encourage the use of the Simi site, the waste documentation regulations are now modified, the gate fee lowered to $2.40/t ($2.20/ton), and pesticide containers are accepted five days a week. There are five test wells for leachate/gas monitoring. The anticipated life of the site is 7 to 8 years.

Case Study No. 4. Wes-Con, Inc., Titan Site, Owyhee County, Idaho. A 7-ha (17-acre) former missle launching site is used by Wes-Con, Inc. for hazardous waste disposal. About 90 percent of the waste handled is process waste from two out-of-state pesticide manufacturing plants. Major impetuses for site establishment were protection of Idaho's environment and potential for a profitable business. The site was established at a cost of about $55,000 and operates under a State permit. The disposal fee ranges from $6.10 to $7.70/t ($5.60 to $7.00/ton). Waste quantities for January to August 1975 ranged from 60 to 558 t (66 to 582 tons) per month. The wastes are unloaded into concrete silos. Clay and water are also added to absorb the impact of the dropping load and to minimize potential for explosion/fire. Because of a very effective public relations program including cooperation with civic groups and donations to community and cultural projects, the operation of the site has been well accepted by the public. The estimated life of the site is about 10 years.

Case Study No. 5. Imperial County Pesticide Container Disposal Sites, Imperial County, California. At six county refuse disposal sites a section has been fenced off and used for the disposal of empty and rinsed pesticide containers. The operation was started in 1972 to serve the County agricultural industry and to comply with State regulations. The site is open one or two days per month. The cost for the development of pesticide disposal sections were absorbed in the total cost of solid waste disposal. The annual operating cost for the six pesticide disposal sections is about $5,000. The annual quantity of pesticide containers handled at the sites range from 204 to 500 m^3 (267 to 653 yd^3). Waste disposal is by the trench method. To discourage improper disposal, pesticide containers are marked with the agricultural pesticide dealer's license number and the number of Imperial County permit to apply pesticides. To encourage proper disposal, there are no disposal fees for pesticide containers. Some fires have occurred due to the presence of residual sulfur in certain waste paper bags. The fire hazard has been eliminated through waste segregation whereby paper bags are deposited at one end of the disposal trench (away from the metal cans). The anticipated life of the sites varies from 20 to 50 years.

Case Study No. 6. Powersville Sanitary Landfill, Peach County, Georgia. This is a State-approved county landfill, a section of which is fenced off for use by a formulating plant for disposal of empty pesticide containers (9.2 m^3 or 12 yd^3 per week). The formulating company paid only for fence installation ($3,000 to $4,000). The disposal trench is on high ground and is protected with 3 m (10 ft) of dense clay. The installation of the fence and the danger signs initially arouse concern of some area residents. The advantages and the objective of the effort were explained to them by the State. The estimated life for the entire site is about 25 years.

Case Study No. 7. Concrete Culverts for Pesticide Encapsulation in Sanitary Landfills, Mississippi. At 17 of the 52 State-approved sanitary landfills, vertical below-ground concrete culverts have been installed for disposal of small quantities of calcium arsenate which is no longer used in the field. The culverts sit on a concrete base. To increase capacity, the base may be located at a deeper depth and several culverts joined together to increase the height. Ordinarily, the top culvert extends aboveground and is provided with a metallic frame and a cover fitted with a lock. When a capsule becomes full, concrete is poured to seal the top. When large centralized hazardous waste disposal facilities become available, the content of these culverts may be transferred to such sites for permanent disposal. The culvert encapsulation is a very new program. Originally there was some reluctance on the part of the landfill operators to use the concrete containers. The value of the project was explained to them by the State.

Case Study No. 8. Wheeling Disposal Site, Andrew County, Missouri. The site is a large municipal/industrial disposal facility owned and operated by Wheeling Disposal Service Co., Inc. The site operates under a permit from the Missouri Department of Natural Resources. Pesticide disposal was started in July 1975, and all wastes handled (de-registered and off-spec products, clean-up material, and used containers) have been from a local formulating company. Wheeling provides hauling service to its customers. The operation is at its infancy and very new to Missouri. There are several monitoring wells at the site. Originally, the State received some inquiries from certain area residents concerning potential adverse environmental effects of the operation. The State gave assurance on the adequacy of the protection measures.

Case Study No. 9. Browning-Ferris Industries, Inc. Landfill, Darrow, Louisiana. Browning-Ferris Industries (BFI) purchased the site in 1972 from a private party. The site is operated under a State permit and handles industrial dry trash. The load from one company contains up to 272 kg (600 lb) of maleic hydrazide per year. BFI offers hauling service to its customers. Wastes are deposited in a pit, and compacted with a bulldozer. Monitoring consists of periodic air sampling and inspection of drainage water for leachates. The estimated life of the site is about 20 years.

Case Study No. 10. Des Moines Metropolitan Solid Waste Agency (Metro) Sanitary Landfill, Polk County, Iowa. This is a regional sanitary landfill with a service area of about 1,554 km^2 (600 mi^2). Metro is a quasi-public agency comprised of 15 cities and Polk County. The operation started in 1972. The initial capital cost was financed through revenue bonds. The disposal fee is \$0.98/m^3 (\$0.75/yd^3). About 7.6 m^3 (10 yd^3) per week of empty pesticide containers from a local formulating plant are currently accepted at the site on a regular basis. Waste disposal is by the trench method. Initially there was considerable opposition to the proposed location of the site and the disputes were resolved by court action. The estimated life of the site is about 7 to 8 years.

II. CONCLUSIONS

Each of the 10 landfills considered in the study is unique in many respects and has been designed and tailored to serve specific disposal needs and for specific hydrogeological and environmental conditions. Every case study, however, offers certain valuable lessons which are of somewhat broader applicability in connection with planning, establishment, and operation of pesticide disposal sites and potential problems which may be anticipated and methods for their resolution. Based on the cases studied, the following general conclusions can be offered:

1. In many areas of the country there is a great need for establishment of pesticide disposal sites (or for development of alternate environmentally acceptable disposal methods).
2. When technically feasible and economically justifiable, a sparsely populated or isolated location is most desirable for locating a landfill.
3. In landfills which receive both pesticide and non-pesticide wastes and which are hydrogeologically suitable for accepting pesticide wastes, it would be environmentally more suitable and operationally safer if a portion of the site is fenced off and devoted solely to the disposal of pesticide wastes.
4. Names or signs such as "containment site","environmental protection site", etc., which emphasize the positive aspect of a landfill operation are generally psychologically more acceptable to the general public than such titles as "hazardous waste" or "toxic chemical" landfill.
5. An effective public relations program is valuable to the acceptance of a pesticide disposal site in a community; such programs may include but not necessarily be limited to: (a) consultation with and solicitation of support from key members of the community throughout the planning,

design, and operation of the site, (b) providing free disposal service to local residents, public institutions, etc., (c) conducting educational tours of the disposal operation, (d) review of and immediate consideration of complaints received from any individual or organization, and (e) mailing information circular to potential site users informing them of the existence of the site and the services offered.

6. Regulations requiring rinsing of pesticide containers are usually very difficult to police and enforce. Certain Regional Water Quality Control Boards in California require that pesticide containers should only be accepted in Class I sites (which are for the disposal of hazardous chemicals), as there are no guarantees that the containers received at Class II-1 sites (used in other areas for rinsed containers) are indeed rinsed as required. In one state, the use of an "honesty system" whereby the farmers would be required to sign a form stating that the containers are indeed empty and rinsed is being investigated as a deterrence against disposal of unrinsed containers.

7. Unreasonably high gate fees, elaborate requirements for waste documentation, and use of very narrow and limited site opening hours and schedule can discourage some potential site users who may find it more attractive to take wastes to other disposal sites which may offer them a more favorable treatment. Disposal rates should be competitive with those charged at other landfills in the general area, and the operating schedule and waste documentation requirements should consider, whenever possible, the views and preferences of the potential site users. Many large pesticide applicators prefer to accumulate containers and use the services of their own employees to haul the containers to the disposal site during days when no pesticides are applied (e.g., due to poor weather

conditions). Some sites prefer to absorb the cost of pesticide disposal elsewhere (e.g., in the cost of an overall program of solid waste management) and charge no gate fees for the disposal of pesticide wastes. Such a policy is considered to encourage waste generators to bring in their wastes for proper disposal.

8. Many industrial waste generators which use services of off-site waste disposal facilities prefer to deal with disposal companies which are financially sound and conduct an environmentally acceptable operation. The practice of sending a technical representative to inspect and approve of the site prior to signing a contract for waste disposal is an outstanding approach and reflects the position that the responsibility for safe disposal of waste does not terminate when the waste leaves the plant premises. It is also a good practice to hire reputable commercial waste haulers and to send an observer to the disposal site with each waste load to assure that the wastes indeed reach their intended destination and that they are disposed of in an approved manner.

9. When carried out in accordance with recommended procedures, resource recovery involving reconditioning and reuse of rinsed large pesticide containers and shredding of rinsed containers to salvage metals is environmentally more desirable than container disposal in landfills. In certain areas where resource recovery is economically attractive, refuse disposal sites or other locations may be designated as centers where waste generators can bring in their containers for shipment to recycling centers. The public support for the program can be broadened if a portion of the revenue from the recycling operation is donated to charitable organizations or used to support community projects.

III. INTRODUCTION AND OBJECTIVES OF THE STUDY

Each year the agricultural industry in the United States uses large quantities of pesticides and generates a significant amount of wastes which have to be safely disposed of in order to protect the public health and minimize the potential for environmental contamination. Based on the U.S. Tariff Commission preliminary report for 1973,[1] approximately 585 t (645 tons) of synthetic organic pesticides and related products, valued at $1,445 million dollars, were produced in the United States in 1973. Pesticide wastes originate in the manufacturing, formulation, distribution and use of the pesticides and include production/formulation process wastes, unwanted and banned products and empty pesticide containers. Although no accurate data are available on the total quantity of pesticide wastes which are generated in the United States, the magnitude of the waste disposal need of the industry can be appreciated when it is considered that in California alone an estimated 7 million agricultural chemical containers (metal drums, cans, glass jars, plastic bags, paper bags) were generated in 1974.[2] This number is in addition to an estimated 10 million small containers which resulted from household and garden use.[2]

Of the several methods available for the disposal of pesticide wastes, disposal in properly engineered and operated landfill and land burial sites have gained considerable popularity in recent years. A number of states, most notably among them California, have developed programs regulating the land disposal of pesticide wastes and have authorized specific sites for the disposal of such wastes. Similar programs are currently being developed in a number of other states. In some heavily agricultural states, because of the heretofore unavailability of suitable disposal sites and a lack of other environmentally acceptable disposal/reuse alternatives, large numbers of empty pesticide cans have been accumulated in temporary storage facilities (barns, hangers, fenced areas, etc.) or have been or are discarded in municipal refuse dumps or buried in scattered locations on the farmland.

In recent years, a number of documents[3-7] have been published on the engineering aspects of site selection, and construction and operation of landfills for the disposal of pesticides and other hazardous wastes. Very little information, however, is currently available to pesticide disposal site planners on potential economic, political and social problems associated with establishment and operation of such sites and on possible approaches to the mitigation of such problems.

Under Contract No. BOA 68-01-2956, Task Order 68-01-3204, with the U.S. Environmental Protection Agency, Office of Solid Waste Management Programs, Hazardous Wastes Management Division, TRW undertook an in-depth "case study" of 10 selected landfills which: (a) have been designed and are used specifically for the disposal of pesticide wastes and pesticide containers; and/or (b) have been designed with consideration for accepting pesticide wastes but are used for the disposal of a variety of wastes including pesticide wastes. The case studies have involved visits to the disposal sites and collection of data on historical background and environmental, political, social, economic and institutional aspects of establishment of the selected sites. The data collected are summarized, presented, and discussed in this report which is intended to serve as an information transfer publication whereby the experience accumulated at the operating sites is made available to all individuals, industrial firms, and local and State agencies interested in or involved with the selection, design, operation, and upgrading of sites for pesticide disposal.

Before presenting and discussing the case studies, the details of the methodology used for data collection will be reviewed.

IV. METHODOLOGY

The 10 landfill sites for which detailed information have been collected in the present study were selected from a larger list of disposal sites which was initially prepared based on the review of the literature,* and discussions with the EPA Project Officer, the Solid Waste Mangement representatives at EPA Regional Offices, appropriate state agencies, and the technical staff associated with the operation of pesticide disposal facilities. The basic criteria for the selection of the 10 "finalists" included the following: (a) the site has been designed and is used specifically for the disposal of pesticide wastes or that the site has been designed with the consideration of suitability for accepting pesticide wastes but is used for the disposal of a variety of wastes including pesticide wastes, (b) extent of cooperation offered by agencies/personnel associated with the operation of the site, (c) amount of data available, and (d) consideration for the representation of spectra of geographic locations, waste processing/disposal methods (storage, container crushing, encapsulation, etc.), site characteristics, and type and organization of the operating agencies (e.g., private companies versus public agencies). The collection of data on the 10 sites involved visits to the sites and discussions with individuals responsible for the operation of the sites. In most cases the data collected during the site visits were later supplemented by additional inquiries directed at state/county agencies and consulting engineering firms which were identified as possessing additional data on certain aspects of the establishment or design of the sites.

The 10 sites which were studied in detail in this investigation are listed in Table 1. Also included in this table are dates of the site visits and the individuals who were contacted (at the sites and elsewhere) for data acquisition. In three of the Case Studies (Nos. 2, 5, and 7) each "site"consisted of several disposal locations. In each case only one or two of the representative disposal locations were actually visited, although

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* The document listed as Reference 8 in Section VII which was made available to TRW by EPA in the draft form was most helpful in the preparation of the initial list of pesticide disposal sites.

Case Study No.	Disposal Site/Location	Operating Agency/Company and Address	Date of Visit	Persons Visited/Sources of Data
1.	Big Blue Hills Disposal Site; Coalinga, Ca.	Fresno County Department of Public Works 4499 East Kings Canyon Road Fresno, Ca. 93702	October 23, 1974	Fresno County Department of Public Works: Clinton D. Beery K. D. Swarts Edward Wade (209) 488-3820
2.	Agriculture Chemical Container Disposal Sites; State of Nevada Lovelock Disposal Site Fallon Disposal Site Orovada Disposal Site Middle Reese Disposal Site	Farmer Cooperative Organization ("Weed Control District") Farmer Cooperative Organization ("Mosquito Abatement District") Northrup King Seed Company (a private firm) A Private Rancher	August 14, 1975	University of Nevada Cooperative Extension Service: Dr. Harry Smith (702) 784-6911 Nevada Environmental Protection Services: A. J. Vandenburg (702) 885-4670
3.	Simi Sanitary Landfill; Simi Valley, Ca.	Ventura Regional County Sanitation District 181 South Ash Street P.O. Box AB Ventura, Ca. 93001	August 20, 1975	Ventura Regional County Sanitation District: Mohammed Hasan (805) 648-2717 John A. Lambie Phillip A. Beautrow Robert L. Hart Lewis A. Thompson Michael E. Williams Moreland Investment Company: Carl Vogel (805) 526-4255
4.	Wes-Con, Inc., Titan Site Owyhee County, Id.	Wes-Con, Inc. P.O. Box 564 Twin Falls, Id. 88301	August 28, 1975	Wes-Con, Inc.: Gene Rinebold (208) 734-7711 State Dept. of Environ. and Com. Services: Ed Baker EPA Region X: Stan Jorgensen
5.	Imperial County Pesticide Container Disposal Sites; Imperial County, Ca. Calexico Disposal Site Holtville Disposal Site Imperial Disposal Site Niland Disposal Site Palo Verde Disposal Site Picacho Disposal Site	County of Imperial Department of Public Works Courthouse, El Centro, Ca. 92243	July 10, 1975 July 10, 1975	County of Imperial Department of Public Works: Harold Goff (714) 352-2855 Alan R. Crossman David E. Pierson County of Imperial Agricultural Commissioner: Claude Finnell (714) 352-3610
6.	Powersville Sanitary Landfill; Powersville, Ga.	Peach County/City of Fort Valley	August 8, 1975	Georgia Department of Natural Resources Environmental Protection Division: Clyde F. Fehn (404) 656-2833 Howard L. Barefoot Woolfolk Chemical Works, Inc.: J. H. Thurman (912) 825-5511
7.	Concrete Culverts for Pesticide Waste Encapsulation in Sanitary Landfills, State of Mississippi; Seventeen State-approved County Sanitary landfills in Mississippi	Various Counties in Mississippi	August 7, 1975	Mississippi State Board of Health: Jack McMillan (601) 354-6616 Curtis Garner
8.	Wheeling Disposal Site Andrew County, Mo.	Wheeling Disposal Service Co., Inc. 1805 South 8th Street St. Joseph, Mo. 64503	August 4, 1975	Wheeling Disposal Service Co., Inc. Clay Buntrock (816) 279-0815 Emcon Associates: Don Andres (408) 275-1444
9.	Browning-Ferris Industries, Inc. Landfill, Darrow, La.	Browning-Ferris Industries, Inc. P.O. Box 3111 Baton Rouge, La. 70821	July 7, 1975	Browning-Ferris Industries: Harley Brown, (504) 356-2478; Ben Gillespie (713) 790-1611; Louisiana State Department of Health: G. Roy Hayes (504) 527-5123
10.	Des Moines Metropolitan Area Solid Waste Agency Sanitary Landfill, Polk County, Ia.	Des Moines Metropolitan Area Solid Waste Agency 3121 Dean Street Des Moines, Ia. 50309	July 5, 1975	Iowa Department of Environmental Quality: Peter Hamlin (515) 265-8134 George Welch Des Moines Metropolitan Solid Waste Agency: Robert Porter (515) 265-8106 Helena Chemical Company: Larry Tylor (901) 761-0050

TABLE 1
LANDFILL SITES AND SOURCES OF DATA FOR THE CASE STUDIES

pertinent data were collected on the operation of all sites. At the Wes-Con Site (Case Study No. 4), pesticide wastes are disposed of in deactivated Titan missile silos. Although waste disposal in 49-m (160-ft) deep reinforced concrete structures cannot be considered a "landfill" operation in the strict engineering definition of the term, the site was included in the study, as it has much to offer to the pesticide disposal site planners, specifically from the standpoint of an effective public relations program for staving off possible public opposition to the establishment and operation of the site.

To assure accuracy and thoroughness of the coverage, an advance copy of the draft write-up on each case study was submitted for review to the individual(s) interviewed during the site visits. The reviewers were asked "to feel free to make any changes (deletions, additions, and modifications) as deemed necessary in the light of the objective and the overall goal of the program". The comments received from the reviewers were studied and incorporated in the Final Report as necessary.

V. CASE STUDIES

The data collected on the 10 landfill sites are presented in this Section as 10 separate individual case studies (designated 1 through 10). For each case study, the data are arranged and discussed under the following nine headings: "Site Location", "Operating Agency", "History and Background", "Factors/Agencies Contributing to the Establishment of the Site", "Sources, Nature, Quantities and Handling of Pesticide Wastes", "Sources of Funds and Cost Data", "Social Problems and Their Mitigations", "Environmental Considerations" and "Anticipated Site Life/Future Use". In a number of cases certain items of data which did not directly pertain to the case study but were relevant to the overall study objective, are presented at the end of the case study under the heading "Miscellaneous".

CASE STUDY NO. 1

Big Blue Hills Disposal Site, Coalinga, California

Site Location - Fresno County, California; site located on the eastern slopes of the coast range, approximately 16 km (10 mi) northeast of Coalinga and 64 km (40 mi) southwest of Fresno. A vicinity map for the site is shown in Figure 1.

Operating Agency - Fresno County Department of Public Works.

History and Background - The site is a California Class I* disposal site which accepts primarily unrinsed pesticide containers. The site has been designed and is operated to serve the waste disposal needs of the agricultural industry in Fresno and adjacent counties. The operation at the site was started in November 1973, and the site is only open a total of 4 weeks each year (2 weeks in the fall and 2 weeks in the spring). The land is a 13-ha (32-acre) parcel which was purchased from the Standard Oil Company of California. There are numerous oil wells in the area and the site is enclosed within Standard Oil Company property.

Factors/Agencies Contributing to the Establishment of the Site - Each year, the agricultural industry in California uses large quantities of insecticides, herbicides, defoliants, and related chemicals for crop production. Safe disposal of the empty chemical containers and the discarded and reject chemicals is essential to avoid widespread environmental contamination. Prior to the development of the Big Blue Hills disposal site, many thousands of empty containers were accumulated in hangers, barns, or fenced areas throughout the heavily agricultural Fresno County and adjoining crop-producing communities. Since an effective industry program involving reclamation/reuse of empty containers was lacking, Fresno County assumed the responsibility for developing and operating a Class I landfill site for the disposal of such agricultural wastes.

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* Under California Classification System, Class I sites are those which present "no possibility of discharge of pollutant substances to usable waters". Class I sites can be used for the disposal of all waste groups including those containing hazardous chemicals (see Appendix B for the description of the California disposal site and waste classification system).

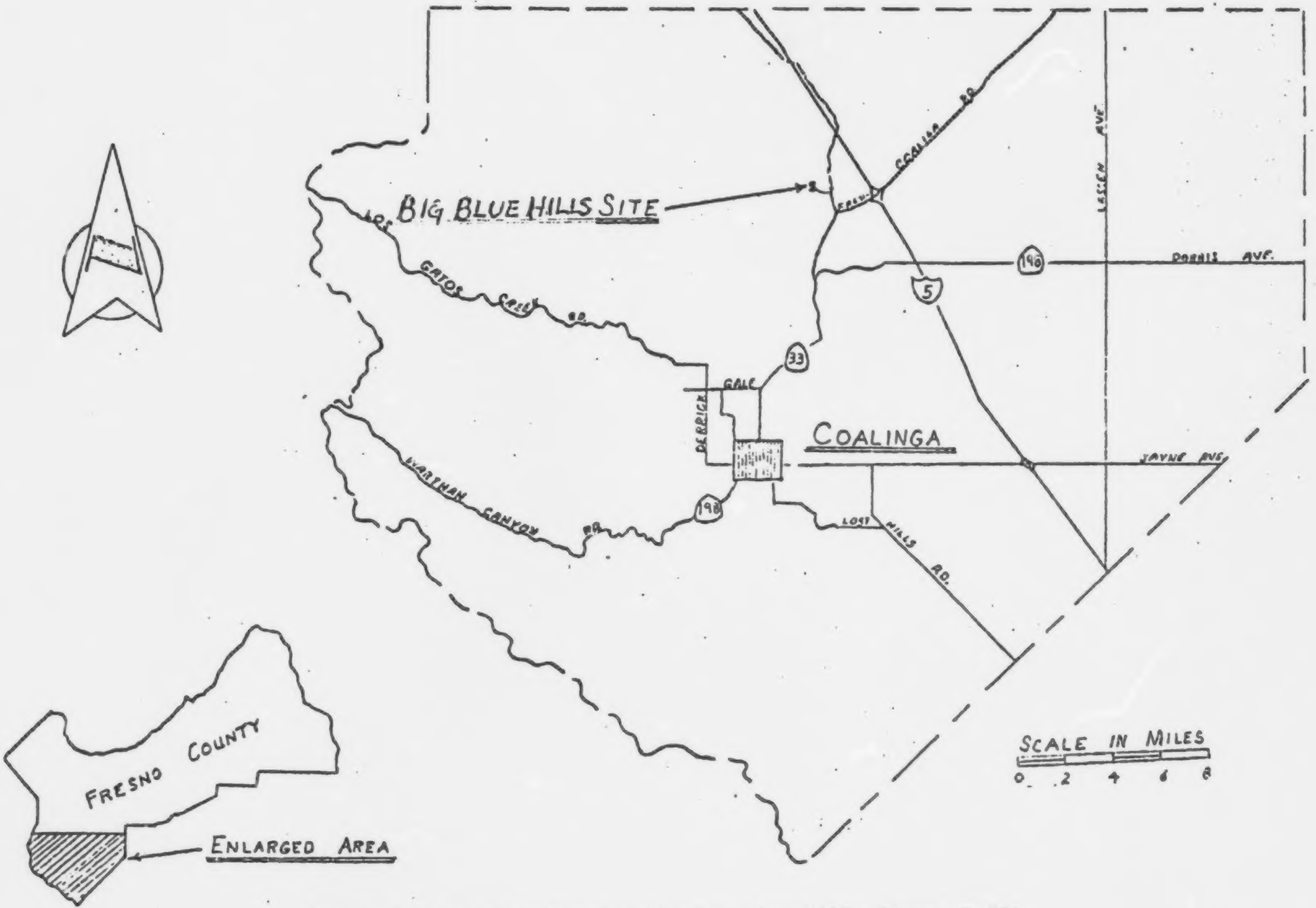

BIG BLUE HILLS SITE
COALINGA RD.
LASSEN AVE.
DORRIS AVE.
198
5
33
LOS GATOS CREEK RD.
GALE
DERRICK
COALINGA
JAYNE AVE.
LOST HILLS RD.
WARTHAN CANYON RD.
198
SCALE IN MILES
0 2 4 6 8
FRESNO COUNTY
ENLARGED AREA

Figure 1. Vicinity Map for the Big Blue Hills Disposal Site

Sources, Nature, Quantities, and Handling of Pesticide Wastes - Before the actual opening of the Big Blue Hills disposal site, an extremely heavy inflow of waste had been anticipated for at least the first few seasons of the operation due to expected rapid "unloading" of the empty containers which had been accumulated over the years at various temporary farm storage facilities. Indeed the possibility of traffic jams was a serious concern to the local authorities. Since the site became operational, however, the farmers and the agricultural chemical distribution houses have been somewhat slower than expected in unloading their stored material.

A copy of a summary report submitted to the State on the disposal operation during October 21 to November 1, 1974, is presented in Appendix C. The material handled during this period of operation consisted of 5,050 m^3 (6,600 yd^3) of various pesticide containers (crushed and uncrushed), 180 t (198 tons) of zinc sludge waste 15 t (17 tons) of diluted pesticide residue, and 24 m^3 (31 yd^3) of mercury contaminated seed. Approximately 42 percent of the material received at the site originated from some 33 California communities outside Fresno County (primarily from adjacent counties). The California "Liquid Waste Hauler Record" form (see "Environmental Considerations" below) which is used for waste documentation, does not require chemical identification of the waste, except for gross classification into such general categories as pesticides, solvents, tank bottom sediments, etc. A partial listing of the various chemicals received at the site during the fall 1974 operation is presented in Appendix C.

In the spring of 1975, the site was opened for operation on April 21 and was scheduled to be open for a 10-day period through May 2. Due to an explosion and fire (see section on "Environmental Considerations"), which caused extensive damage to the crawler tractor dozer, the site was closed on April 24 and the spring operation was terminated. During the 3.5 days of operation, approximately 1,071 m^3 (1,400 yd^3) of material was received. About 38 percent of the loads of hazardous waste received was from outside of Fresno County (primarily from adjacent counties). Except for one time when a load of contaminated material from Guam was accepted, none of the wastes received to date at the site have been from sources outside California.

Wastes are hauled to the site by commercial waste haulers and by the waste generators. The general disposal procedure consists of first excavating a 6.1-m (20-ft) deep trench. The waste material is then emptied into the trench at one end and dozed and compacted with a bulldozer. At the end of each working day, the waste is covered with 15 cm (6 in.) of fresh dirt. A minimum of 30 cm (12 in.) of dirt cover is provided when the site is closed for the season. When a trench is filled to full capacity, it will be covered with 1.8 m (6 ft) of dirt as a final cover.

Sources of Funds and Cost Data - The total initial cost for the development of the Big Blue Hills disposal site was $12,711 which was paid for from county general funds. The initial cost consisted of the following items:

Land - $3,176.00
Trench excavation (7,650 m^3 or 10,000 yd^3) - $3,735.00
Fencing (610 m or 2,000 ft) - $2,100.00
Safety equipment - $850.00
Access road, signs, incidentals - $2,850.00

The operating costs (labor, equipment, maintenance) for 1973-74 were $5,731.00 and for 1974-75 were $9,777.00, financed in part by disposal fees with balance from county general funds. The gate fee consisted of $0.98/$m^3$ ($0.75/$yd^3$) county fee and $0.67/t or $0.60/ton ($1.00 minimum) State fee. The county fee has just been increased to $2.29/$m^3$ ($1.75/$yd^3$). The total State fees collected were $144.60 for the 3.5 days of operation in 1975, and $930.25 for the fall 1974 operation. The tonnage of the containers in each waste load is estimated at the gate through actual measurements of the bulk volume and an assumed bulk specific volume of 10 and 2.5 m^3/t (12 and 3 yd^3/ton) for crushed and uncrushed containers, respectively. Unless prior credit arrangements are made, fees are collected in cash at the gate.

Social Problems and Their Mitigations - The need for the establishment of a site in Fresno County for the disposal of the pesticide containers was well recognized by the agricultural and community civic leaders. There were, however, some questions and reservations as to the exact location for the site. Originally, a site in a different location in the general area was proposed and tentatively approved by the California Water Quality Control Board (Central Valley Region) for use as a Class I site. In a public hearing the Board heard and considered all comments pertaining to the proposed site including geological data which indicated a possibility of hydraulic continuity with usable ground waters. The proposed location was thus abandoned in favor of the existing location. As will be discussed below in connection with "Environmental Considerations", prior to the activation of the present site an environmental impact study was conducted and the findings were made available to all interested parties for review and comment. Since the inception of the operation there has been no public objection to the operation of the site.

Environmental Considerations - Selection of the Big Blue Hills disposal site was based upon recommendations from geologists representing the California Regional Water Quality Control Board, the State Division of Oil and Gas, and the Standard Oil Company from whom the property was purchased. The geological formation at the site is classified as Santa Margarita formation. The upper soil is Kettleman-Linne, moderately shallow alkaline sandy loam, overlying soft calcareous sand stone. Permeability is moderate to low, surface runoff is rapid, water holding capacity is moderate to low and erosion hazard is moderate. The site is not in hydraulic continuity with fresh water-bearing zones in adjacent areas. The area is semi-arid with a mean annual precipitation of about 25 cm (10 in.) and annual evaporation rate of about 165 cm (65 in.). The topography is hilly and the surface run-off is generally very rapid. The elevation at the site varies from 250 m (820 ft) at the eastern boundary to 299 m (980 ft) along the western boundary.

Prior to the purchase of the land and site preparation, and in compliance with the requirements of the California Environmental Quality Act, Fresno County Department of Public Works prepared a draft environmental impact statement (EIS) which was then submitted for review and comment to all interested parties including a number of local, State, and Federal agencies with expertise and/or interest in the proposed action. The reviewers' comments were discussed and adequately responded to in the final EIS. The final EIS concluded that the adverse environmental effects associated with the operation of the Big Blue Hills disposal site are of limited nature and are outweighed by the environmental benefits accrued from controlled disposal of pesticide wastes and containers at a centralized location. The following were identified as probable adverse environmental effects which could not be avoided: (a) increased traffic flow during days that the site is open; (b) removal of a relatively small grazing area; (c) disruption of wildlife during operating periods; and (d) introduction of hazardous chemicals into the soil.

To contain the operation, the actual operating area (a segment within the total land parcel) is fenced off. There is a field office at the site which is housed in a trailer house. There is one operator and a "fee collector" at the site. There is two-way radio communication between the field office and the headquarters (Department of Public Works) in Fresno. There are a safety shower and an emergency eyewash at the site.

California regulations on hazardous waste management require the use of "The California Liquid Waste Hauler Record (Manifest)" for recording and documenting all liquid and/or solid hazardous wastes transported to waste handling facilities, including processing plants, resource recovery facilities, or disposal sites. The Manifest, a blank copy of which is included in Appendix C has three sections: one section must be completed by the waste producers, one by the waste hauler, and one by the hazardous waste disposal facility operator. When completed by the disposal site operator, the document will be in duplicate; one copy for the State and one copy for the county. The State copies are sent to the State on a monthly basis. California is contemplating the use of a computerized system for data processing which would enable "tracking" of hazardous wastes from the point of generation to the point of ultimate disposal. The system would provide for effective policing and enforcement and would assure that a hazardous waste hauled away by a waste hauler would reach its intended destination and is disposed of at an authorized site and in accordance with State regulations. On the Manifest form, spaces are provided for code numbers to be used in the computer programs and data processing system. No code numbers are required at this time.

Since the site was first opened in November 1973, there has been only one incident of explosion and fire at the site. This incident, which occurred on April 24, 1975, caused extensive damage to the crawler tractor dozer and resulted in the closing of the site after only 3.5 days of operation. The explosion occurred when the dozer made its first pass over an area of uncrushed cans in the first step to crush and compact the cans prior to covering with dirt. The dozer track ran over a drum full of inflammable liquid, not identified on the Waste Hauler Record, which ruptured and started the fire. There were no serious injuries to personnel, however, two firemen and two county employees were taken to the Coalinga Hospital as a precautionary measure.

Anticipated Site Life/Future Use - According to estimates by the Fresno County Department of Public Works, the present site would be adquate for at least 20 more years of service. No plans have been formulated for future use of the land when the site becomes full.

CASE STUDY NO. 2

Agricultural Chemical Container Disposal Sites, State of Nevada

Site Locations -

Site	Location
Lovelock Disposal Site	Lovelock, Nevada (Pershing County)
Fallon Disposal Site	Fallon, Nevada (Churchill County)
Orovada Disposal Site	Orovada, Nevada (Humboldt County)
Middle Reese Disposal Site	Middle Reese, Nevada (Lander County)

Operating Agencies - Lovelock and Fallon disposal sites are operated by farmer cooperative organizations ("Weed Control District" and "Mosquito Abatement District", respectively). The Orovada disposal site is operated by Northrup King Seed Company (a private firm). A private rancher operates the Middle Reese disposal Site. (The Middle Reese site is currently inactive).

History and Background - The four disposal sites which are located in the State of Nevada are on land obtained under special land use permits from the county (Lovelock and Fallon sites) and from the Bureau of Land Management (Orovada and Middle Reese sites). The operation of the sites was started in 1971-72 and the current land use permits are for five years and are to be renewed in 1976-77. The sites were developed to serve the need of the agricultural industry in the area.

The working area at each site (roughly 0.2 to 1.0 ha or 0.5 to 2.5 acres) is secured by a "no-climb" 1.8-m (6-ft) fence topped with strands of barbed wire. Except during operating days, the entrance gate is securely locked. Ordinarily, each site is open only a total of six to seven days per year, usually during the months of May through November. On special occasions and by prior arrangement, a site may also be opened to accept special waste loads.

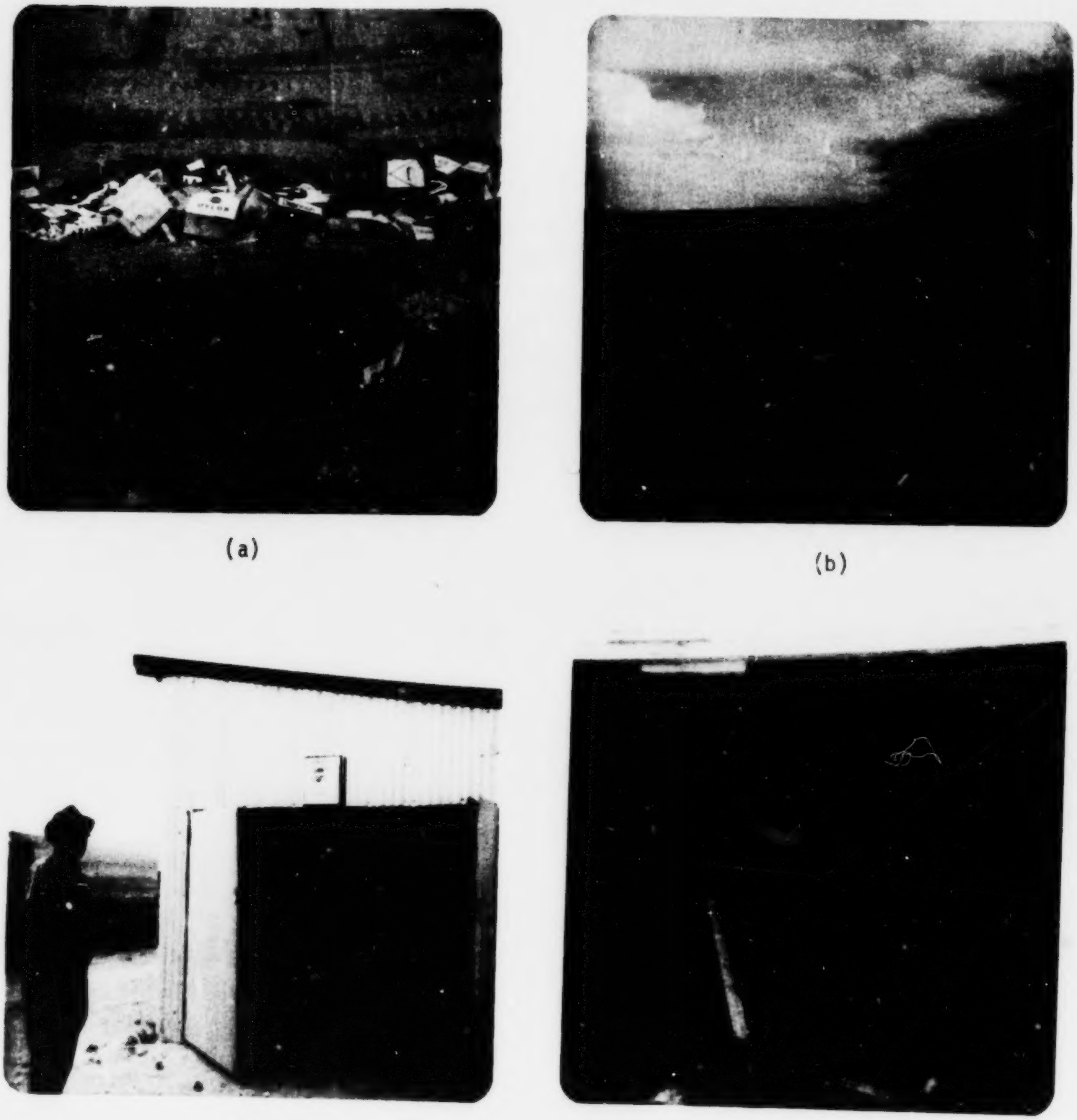
Physically, each facility consists of a disposal pit, an adjacent sump (for container draining and rinsing), and a storage shed which houses a water tank and a container crusher. The water tank is used as a safety shower and for flushing chemical spills from the operating personnel and their equipment. A description of the sump and data on the original dimensions of the four disposal pits, the approximate distance from each site to the nearest residence, and the number of parties (crop dusters, individual farmers and ranchers) served by each disposal site are presented in Table 2. Three of the sites (Lovelock, Orovada, and Middle Reese) are located in areas which are readily accessible to all users. The Fallon site is located in a rugged terrain and pesticide containers are taken to the site by the site operator who uses a 4-wheel drive vehicle for container transportation. In general, the maximum distance that a farmer or rancher has to travel to get to a disposal site is 97 km (60 mi).

Figure 2 contains some photographs of the Lovelock disposal site, including the sump in the covered and uncovered positions, the general background topography, the storage shed, and the can crusher and storage tank in the shed.

Factors/Agencies Contributing to Establishment of the Site - The problem of the disposal of pesticide containers in the agricultural areas of Nevada was of a long-standing nature. Impetus for the development of the pesticide container disposal sites was gained about 1970 when several illegal dumps were discovered (mostly in Middle Reese, Lander County) on lands belonging to the Bureau of Land Management (BLM). This, coupled with several incidents in which area residents (a child in one case) were poisoned with residual pesticides in the containers, brought attention to the need for safe disposal of the containers. Several area ranchers requested assistance from the Cooperative Extension Service of the University of Nevada in Reno for development of an environmentally acceptable means for disposal of pesticide containers. At about the same time, and in response to the recognition of this same need, the 1971 Nevada legislature enacted a law which delegated responsibility to the State Department of Agriculture for the safe disposal of pesticides and pesticide containers.

TABLE 2
CHARACTERISTICS OF THE DISPOSAL SITES AND APPROXIMATE NUMBER OF USERS

Site	Total Land Area, ha (acre)	Original Disposal Pit Dimensions, m (ft) l x w x d	Sump Description	Approximate No. of Parties Served	Approximate Distance to Nearest Residence, km (mi)
Lovelock (Pershing County)	4 (10)	61 x 6 x 3 (200 x 20 x 10)	Two 208-liter (55-gal) drums placed at a depth of 7.6 m (25 ft), covered with a metal lid.	100	8 (5)
Fallon (Churchill County)	2 (5)	61 x 6 x 3 (200 x 20 x 10)	3 x 3 x 4.6 m (10 x 10 x 15 ft) deep open pit, covered with a metal lid.	200	13 (8)
Orovada (Humboldt County)	2 (5)	61 x 6 x 3 (200 x 20 x 10)	2.4 x 1.8 x 4.6 m (8 x 6 x 15 ft) deep open pit built-up with sand, covered with a metal lid.	150 to 200	23 (14)
Middle Reese (Lander County)	2 (5)	30 x 3 x 3 (100 x 10 x 10)	Same as for Orovada	30	5.6 (3.5)



(a) (b)

(c) (d)

Figure 2. Lovelock Disposal Site

(a) The sump in the uncovered position and the disposal pit in the background.
(b) The sump in the covered position and the general background topography.
(c) Storage shed.
(d) Inside the storage shed, showing the can crusher and the storage tank.

Responding to the farmers/ranchers' request for assistance, Dr. Harry Smith of the University of Nevada, who had prior experience with the disposal of pesticide wastes in Oregon, conducted a general survey of the Reno area and other parts of Nevada and suggested a total of 10 sites located throughout the State which could be used for the disposal of pesticide containers. Four of the sites suggested are those which are currently in operation. (The other six sites were never constructed because of a lack of funds.) These sites were designed by Dr. Smith, who also solicited assistance and received commitments from a number of State and Federal agencies on matters related to land acquisition, funding, disposal site operation and environmental monitoring. The agencies involved in the development and operation of the sites and their responsibilities are listed in Table 3.

In acquiring land for the Orovada and Middle Reese sites, there was some reluctance on the part of the BLM to grant the use permits primarily due to possible adverse environmental impacts of the disposal operation. Dr. Smith had to emphasize that, compared to other possible sites, these two sites were most favorably located from the standpoint of environmental considerations. BLM agreed to grant the use permits provided that adequate measures would be taken to protect the environment and the resources. The current permits for these two sites will expire in 1976-77.

Sources, Nature, Quantity, and Handling of Pesticide Wastes - The four sites serve 16 to 18 crop growing regions in Nevada. The major crops are, in order of decreasing production quantities, alfalfa seed and forage, potatoes, onions, and garlic. As was indicated above, each site is open only for a total of six to seven days per year. Most of the wastes are received during May to June (beginning of the growing season). Smaller quantities of wastes are brought to the site during July to August (mid-season) and in autumn (the end of the growing season). Wastes received in autumn are primarily herbicide (2,4-D) containers. Pesticide containers are brought to the site by individual farmers/ranchers and crop dusters. All containers are supposed to be empty and rinsed before being taken to the site.

TABLE 3
AGENCIES INVOLVED AND THEIR RESPONSIBILITIES

Agency	Responsibility
Cooperative Extension Service, University of Nevada	Consults operators of the site and periodically monitors the sites for residues.
State Department of Agriculture	Makes regulations for the sites and enforces them.
Bureau of Environmental Health	Inspects site for possible contamination of air, soil and water.
Agricultural Stabilization and Conservation Service (ASCS)	Through the Rural Environmental Assistance Program, assumed 80 percent of construction costs and crushing equipment for the four existing sites.
Soil Conservation Service (SCS)	Determined need and practicability of the site prior to construction; after construction, determines the extent of fulfillment of site specifications.
Farmers/Ranchers	Assumed portion of the cost not covered by ASCS. Available growers associations also assume responsibility for site operations.
Bureau of Land Management (BLM)	Provides property on special land use permits to the county.
County Commissioners	Apply for 1.2 to 2.0 ha (3 to 5 acres) of BLM land under special land use permits. Grade the road to the sites and maintain same. Periodically bulldoze earth over pesticide containers in each pit when not available elsewhere.

Pesticides most widely used in the region fall into five chemical classes . These classes and the specific pesticides which are most frequently used are listed in Table 4. By far the major pesticides used are organophosphorous compounds, carbamates, and dinitro compounds.

The pesticide containers handled at the site consist mainly of 208-liter (55-gal) and 114-liter (30-gal) drums, glass containers, and cardboard boxes. No accurate quantitative records have been kept of the material deposited at each site. However, according to Dr. Smith, on the average each site user generates three to four 208-liter (55-gal) containers each year. For the approximately 480 to 530 parties which use the four sites, the total number of 208-liter (55-gal) drums brought to the sites each year would be in the 1,400 to 2,200 range. According to a State Department of Agriculture agent, since 1972 a total of about 1,500 208-liter (55-gal) drums have been accepted at the Lovelock site.

Pesticide containers brought to the site are first dumped at the edge of the pit near the sump. If a container is not completely empty, it is "drained" into the sump and is rinsed with water before crushing. The rinse water is also added to the sump . The waste material dumped in the sump is neutralized/detoxified by addition of sodium bicarbonate (for organophosphorous pesticides) and sulfuric acid (for chlorinated pesticides). There is no chemical testing (e.g., pH measurement) during neutralization/detoxification procedures The crushers used are old log crushers which have been modified to crush containers. Depending on the unit, one or several containers can be crushed simultaneously. The crushed containers are then manually deposited in the disposal pit. After the site closes, a bulldozer is brought to the site by the site operator and the waste is covered with 46 to 61 cm (18 to 24 in.) of soil removed from a mound of dirt adjacent to the pit. (The cover dirt is the material originally excavated from the pit.) A bulldozer from the County dump is used at Fallon and Lovelock sites. The bulldozers used at Orovada and Middle Reese belong to the local farmers.

Sources of Funds and Cost Data - Construction costs of the four pesticide container dump sites were borne by the USDA Agricultural Stabilization and

TABLE 4
PESTICIDE CONTAINERS HANDLED AT THE DISPOSAL SITES

Chemical Class of Pesticide	Specific Members of Each Pesticide Class
Organophosphorous Compounds	Parathion, Guthion, Co-Ral, Diazinon, TEPP
Carbamates	SEVIN, Zectran, Mobam, TEMIK, Dimeton, Eptam
Chlorinated Hydrocarbons	Aldrin, Dieldrin, Heptachlor, Mirex, Strobane-T, Lindane, Toxaphene, 2,4-D
Inorganic Compounds	Calcium Arsenate, Lead Arsenate, Calcium Hydrogen Arsenate, Arsenic Pentoxide
Botanicals	Sabadilla, Rotenone, Pyrethrins

Conservation Service (ASCS) and by potential site users, i.e., area farmers, ranchers, and crop dusters . The actual costs were $5,800 for the Lovelock site, $7,500 each for the Orovada and Middle Reese sites, and $5,800 to $6,000 for the Fallon site. These costs include the following items:

- Excavation of the pit and sump and initial back filling of the sump with sand.
- Fencing and gate to protect the pit, sump and related facilities.
- Water storage facilities to provide water for flushing accidental chemical spills from operators and equipment.
- Equipment to crush containers and render them useless.

Under the Rural Environmental Assistance Program, the ASCS provided 80 percent of the cost of site construction. The remaining 20 percent of the costs were assumed by the site users. ASCS local representatives conducted a survey of the area farmers/growers to determine potential site users and to enlist their commitment for financing the project. Each user was assessed a certain portion of the total users costs, calculated by dividing the amount by the total number of potential site users. The maximum amount assessed to any one user was $30. The users contributions were then collected by the ASCS local representatives.

The annual operating cost is estimated at close to $300 per site and includes labor fees charged by the site operators, cost of fuel for can crushers, and costs for maintenance of the equipment and site. To date the operating costs have been paid for from the excess funds which were originally collected for the construction of each site. When the excess funds are depleted a system of users charge will be adopted to cover the operating costs. A user charge system currently under consideration for the Orovada site includes charges of $0.50 for 208-liter (55-gal) drums, $0.35 for 114-liter (30-gal) or smaller drums, and $0.15 for glass containers. It is expected that collection of users fees may have to be started sometime in 1976 at the Orovada site and in the next few years at the Lovelock and Fallon sites. Because of the smaller load which is handled at the Middle Reese site and a lower operating cost, it is not anticipated that the collection of users fee will be necessary at this site in the near future.

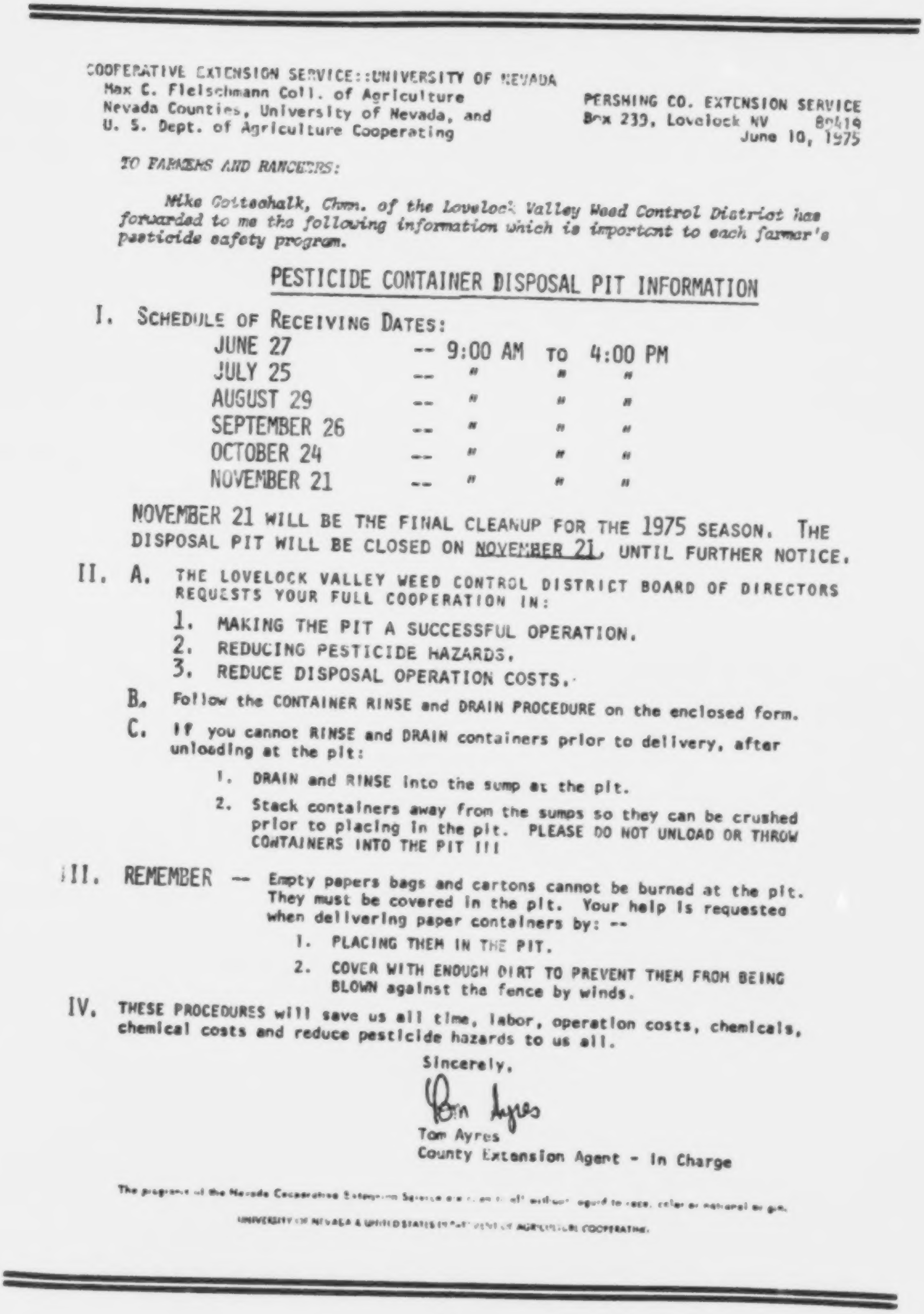
As was indicated above, a total of 10 disposal sites had been originally proposed for the State of Nevada. Six of the sites have not been constructed primarily because the Rural Environmental Assistance Program which covered 80 percent of the costs of the four existing sites is no longer available for cost sharing. A new system whereby the construction costs will be shared jointly and on an equal basis by the users and the individual counties is currently under review. Four of the planned sites are located in the vicinity of Mason Valley, Las Vegas, Ely, and Elko.

Social Problems and Their Mitigations - Since local farmers and ranchers were instrumental in establishing the disposal sites, there has been no local opposition to the construction and/or operation of the sites. Even today, the actual operation and maintenance of the sites is the responsibility of indivdual ranchers, growers and farmers cooperative associations in the area.

The operation of the sites, however, has not been totally trouble-free. A number of problems which have been encountered stem from lack of public responsibility and social awareness on the part of the very small fraction of the site users and community residents. These problems, however, are very minor and are being overcome through a program of public education involving posting of the disposal site regulations in community bulletin boards and making regular announcements in the local papers and radio and television stations on the schedules for the operation of the sites. A typical information bulletin which is posted in public places in shown in Table 5. The minor problems which have been encountered include the following:

(1) In some cases pesticide containers are brought to the site on off-business days and are stacked at the gate or thrown over the fence into the disposal site. This presents a hazard to the site operator who has to go into the pit and remove the containers. Stacking of the containers (some containing residusal pesticides) outside the disposal area presents potential

TABLE 5
PUBLIC INFORMATION BULLETIN ON SITE OPERATION



COOPERATIVE EXTENSION SERVICE::UNIVERSITY OF NEVADA
Max C. Fleischmann Coll. of Agriculture
Nevada Counties, University of Nevada, and
U. S. Dept. of Agriculture Cooperating

PERSHING CO. EXTENSION SERVICE
Box 239, Lovelock NV 89419

June 10, 1975

TO FARMERS AND RANCHERS:

Mike Gottschalk, Chmn. of the Lovelock Valley Weed Control District has forwarded to me the following information which is important to each farmer's pesticide safety program.

PESTICIDE CONTAINER DISPOSAL PIT INFORMATION

I. SCHEDULE OF RECEIVING DATES:

JUNE 27	--	9:00 AM	TO	4:00 PM
JULY 25	--	"	"	"
AUGUST 29	--	"	"	"
SEPTEMBER 26	--	"	"	"
OCTOBER 24	--	"	"	"
NOVEMBER 21	--	"	"	"

NOVEMBER 21 WILL BE THE FINAL CLEANUP FOR THE 1975 SEASON. THE DISPOSAL PIT WILL BE CLOSED ON NOVEMBER 21, UNTIL FURTHER NOTICE.

II. A. THE LOVELOCK VALLEY WEED CONTROL DISTRICT BOARD OF DIRECTORS REQUESTS YOUR FULL COOPERATION IN:

1. MAKING THE PIT A SUCCESSFUL OPERATION.
2. REDUCING PESTICIDE HAZARDS.
3. REDUCE DISPOSAL OPERATION COSTS.

B. Follow the CONTAINER RINSE and DRAIN PROCEDURE on the enclosed form.

C. If you cannot RINSE and DRAIN containers prior to delivery, after unloading at the pit:

1. DRAIN and RINSE into the sump at the pit.
2. Stack containers away from the sumps so they can be crushed prior to placing in the pit. PLEASE DO NOT UNLOAD OR THROW CONTAINERS INTO THE PIT !!!

III. REMEMBER -- Empty papers bags and cartons cannot be burned at the pit. They must be covered in the pit. Your help is requested when delivering paper containers by: --

1. PLACING THEM IN THE PIT.
2. COVER WITH ENOUGH DIRT TO PREVENT THEM FROM BEING BLOWN against the fence by winds.

IV. THESE PROCEDURES will save us all time, labor, operation costs, chemicals, chemical costs and reduce pesticide hazards to us all.

Sincerely,

Tom Ayres

Tom Ayres
County Extension Agent - In Charge

The programs of the Nevada Cooperative Extension Service are open to all without regard to race, color or national origin.

UNIVERSITY OF NEVADA & UNITED STATES DEPARTMENT OF AGRICULTURE COOPERATING.

for the spread of contaminants and is a health and safety hazard to youngsters who might play in the area and use the containers as play objects.

(2) On occasions, the aluminum framed storage sheds which are used to house the safety shower and equipment, have been used by some teenagers for target practice.

(3) Although site users are advised to empty and rinse their cans before bringing them to the disposal sites, in many cases the cans are not rinsed and contain residual pesticide.

Environmental Considerations - The sites were selected to provide minimal adverse environmental impacts, particularly with regard to the possibility of groundwater contamination. Initially, a variety of alternate sites, both on private and public land, were considered and the most suitable sites were chosen based on soil characteristics and location of the water table. The distance to the groundwater at the four operating sites is between 61 to 76 m (200 to 250 ft). The subsurface soil is generally granite or silica-based and relatively impervious to infiltration. The sites are located on the brows of hills so that runoff from adjacent land will not run through the sites. At the Lovelock site a 61-cm (24-in.) bank of soil has also been erected along the north side of the site to divert runoff.

The University of Nevada Cooperative Extension Service conducts periodic monitoring of groundwater, soil, wildlife, air, and vegetation in the surrounding area. The sampling and analysis are usually conducted three times per year and after unusually heavy rains. The sampling program includes the following:

(1) Water samples from wells and streams downstream of the sites .

(2) Soil and vegetation samples taken at locations about 15 m (50 ft) outside of site fences; the samples are analyzed by gas chromatography having parts per billion sensitivity for pesticides.

(3) Air samples taken downwind of the sites.

(4) Wildlife (lizards, rats, etc.) samples are caught, sacrificed, and vital organs are analyzed for pesticide residues.

The sumps used for container draining and rinsing are designed and operated in a manner which minimizes environmental contamination (see Table 2 for the description of the sumps). When not in use, the sumps are covered with metal lids to make them inaccessible to the wildlife (see Figure 2).

Anticipated Site Life/Future Use - As indicated in Table 2 the total land area available at each site for waste disposal is between 2 and 4 ha (5 and 10 acres). Currently, only a portion of the available land is fenced off for waste disposal. The actual area of the disposal pits are only 0.37 ha (0.92 acre) each at Lovelock, Fallon, and Orovada sites, and 0.09 ha (0.23 acre) at the Middle Reese site. When the existing pits become full, additional pits will be excavated to allow the operation to continue. Based on the total land available for pit excavation and the expected waste volumes, each site is expected to have sufficient capacity for about 10 more years of service.

The sites were specifically selected with the intent that the land will never be reclaimed for reuse. Accordingly, there are no plans for future use of the site areas.

Miscellaneous - Currently, there is a great need in Nevada for opening additional sites for the disposal of pesticide containers. In addition to the four sites currently in use, the only other site in Nevada which accepts pesticides is the Nuclear Engineering Site in Beatty which is located at the far southern border of the State. The operators of the four Nevada sites and the agencies involved have received numerous requests from growers in other parts of Nevada and in border areas in adjacent states for permission to dispose of their pesticide containers. In one instance a party in California was willing to pay $1.00 for the disposal of each pesticide container. To date, however, no out-of-state wastes have been accepted at the sites.

CASE STUDY NO. 3

Simi Sanitary Landfill, Simi Valley, California

Site Location - Simi Valley (Ventura County), California address: 1011 Los Angeles Avenue, Simi Valley, California. Figure 3 is a vicinity map for the disposal site.

Operating Agency - Ventura Regional County Sanitation District (VRCSD), 181 South Ash Street, P.O. Box AB, Ventura, California, 93003.

History and Background - Simi Sanitary landfill is a 90.3-ha (223-acre) site of which 32 ha (80 acres) is used as a California Class I site* for the disposal of hazardous wastes (pesticides, sewage sludge, animal carcasses, and chemical wastes). Within the Class I section of the site, there are signs indicating the specific areas which have been set aside for the separate disposal of pesticides, sewage sludge, etc. The site is located in a relatively isolated area and meets all California requirements for Class I sites. It operates under a permit from the Regional Water Quality Control Board and is subject to all the rules and regulations of the County Environmental Resources Agency. Large metal cans and objects are manually removed from the regular refuse during the disposal operation and transferred to large storage carts for subsequent shipment to recycling yards.

The Simi site went into operation in 1970 as a county site, replacing the old Tierra Rejada site which had become full. On July 1, 1972, the operation of the site was taken over by Ventura Regional County Sanitation District (VRCSD) which was created as a result of the decision by the County Board of Supervisors to consolidate all solid and liquid waste management activities within the county and to provide for a more effective operation. Member agencies which are listed in Table 6 consist of Ventura County and nine cities and fourteen districts within the county.

The VRCSD organization consists of a Civil Engineering Unit and a Sanitary Engineering Unit which are responsible, respectively, for solid

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* See Appendix B for a description of California disposal site classification.

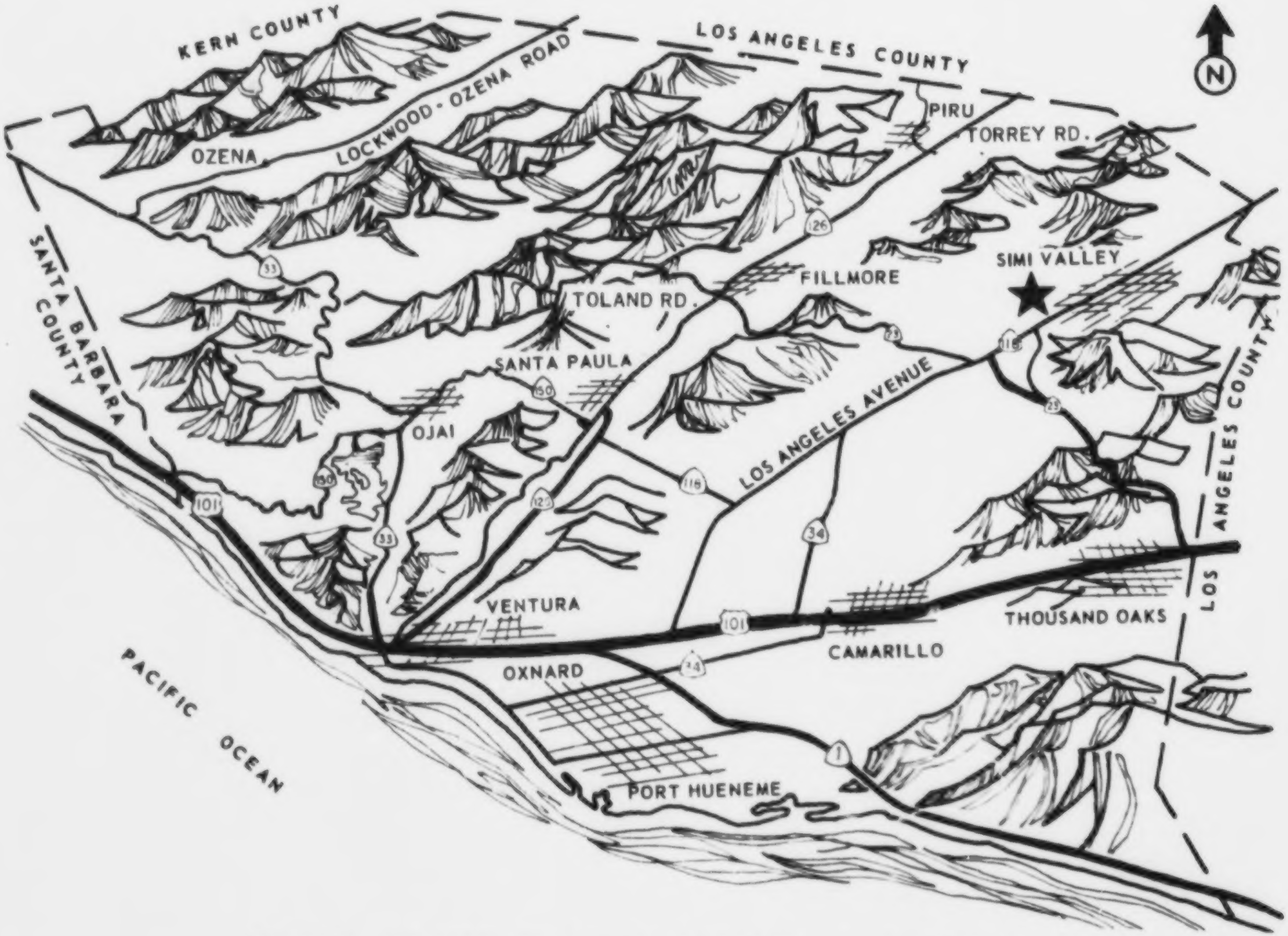
KERN COUNTY
LOS ANGELES COUNTY
N
OZENA
LOCKWOOD-OZENA ROAD
PIRU
TORREY RD.
SANTA BARBARA COUNTY
33
126
FILLMORE
SIMI VALLEY
TOLAND RD.
23
118
SANTA PAULA
150
LOS ANGELES AVENUE
23
OJAI
118
150
101
125
34
LOS ANGELES COUNTY
33
VENTURA
101
THOUSAND OAKS
CAMARILLO
OXNARD
34
PACIFIC OCEAN
1
PORT HUENEME

Figure 3. Vicinity Map for the Simi Valley Sanitary Landfill

TABLE 6
MEMBER AGENCIES IN VRCSD

County	Cities	Special Districts
Ventura	Camarillo	Camarillo Sanitary
	Fillmore	Camrosa County Water
	Ojai	Channel Islands County Water
	Oxnard	Meiners Oaks Sanitary
	Port Hueneme	Montalvo Municipal Improvement
	San Buenaventura	Moorpark County Sanitation
	Santa Paula	Oak View Sanitary
	Simi Valley	Saticoy Sanitary
	Thousand Oaks	Simi Valley County Sanitation
		South Coast County Sanitation
		South Coast County Sewer Maintenance
		Triunfo County Sanitation
		Ventura Avenue Sanitary
		Ventura County Waterworks Districts Nos. 1, 8 and 16

waste management and liquid waste management. VRCSD currently operates three sanitary landfills (including the site in Simi Valley), and two anti-litter stations (for collection of large municipal and agricultural waste items that trash collectors cannot carry away). The Simi site is the only sanitary landfill which accepts pesticide wastes. VRCSD provides no waste collection or hauling service to the users of the Simi site.

Factors/Agencies Contributing to the Establishment of the Site - Ventura County is one of the major agricultural counties in California and ranks first in the production of a number of specific crops. The use of large quantities of pesticides in the county also results in the production of significant quantities of pesticide wastes. The pesticide disposal operation in Simi sanitary landfill was established primarily to serve the need of the agricultural industry in the county. The operation provides for safe disposal of pesticide wastes in an environmentally acceptable manner. As was mentioned above, the site was originally established by the County of Ventura and was taken over by VRCSD in 1972.

Sources, Nature, Quantity and Handling of Pesticide Wastes - Pesticide wastes handled at the site are primarily empty pesticide containers which are required to be triple-rinsed before being brought to the site. The containers received at the site however, are not always tripe-rinsed. Most of the pesticide containers are from within Ventura County with some originating in neighboring counties (primarily Los Angeles and Santa Barbara). On the average, the Simi site as a whole handles 363 t/day (400 tons/day) of solid wastes. Empty pesticide containers account for only a small fraction of the total waste. Based on past records, approximately 64 t (70 tons) of empty pesticide containers are handled at the site each year. However, a significant increase in the quantity of pesticide containers is expected as a result of changes which have been instituted to encourage a greater use of the site by the pesticide waste generators (see discussion below under "Social Problems and Their Mitigations".)

In general the area method of sanitary landfilling is used for the disposal of empty pesticide containers. The containers are crushed and compacted as the bulldozer makes passes over the deposited waste. Highly hazardous pesticides are usually buried in drums. Pesticide containers and wastes which are buried received 15 to 61 cm (6 to 24 in.) of immediate dirt cover.

Sources of Funds and Cost Data - The land at Simi site is leased from Moreland Investment Company which is a wholly-owned subsidiary of Union Oil Company. A portion of the leased parcel is on Union Oil Company property and the remainder is owned by Moreland Investment Company. The lease is for $20,000/year and will expire in December 31, 1987, or when the site is filled, whichever comes first.

The total cost for establishing the site (site preparation, road construction, etc.) was $397,000 (1970 dollars). When VRCSD took over the operation of this and two other county landfills in 1972, $34,000 was transferred to the county for purchase of equipment used at the three sites. The current operating cost at the Simi site is approximately $3.30/t ($3.00/ton) of waste handled. About one-third of the operating cost is paid for through the tax base and the other two-thirds through the gate fee charged to the users.

Since July 1, 1975, when new regulations went into effect (see discussion below under "Social Problems and Their Mitigations") the fees for the disposal of pesticides and pesticide containers have been as follows. Empty pesticide bags and containers, except those "of extremely toxic and water reactive chemicals" are considered "low risk" agricultural wastes and are charged at the regular refuse rate of $2.42/t ($2.20/ton). Before this material can be brought to the site, the hauler must complete an "Empty Container Disposal Permit", which, when validated, allows the hauler a "blanket" usage for a period of one calendar year. A $10 annual fee is charged for review and administration. Full and partially full containers and bags and empty containers of "extremely toxic and water reactive" pesticides are considered as "industrial" hazardous waste and are charged a disposal fee of $8.47/t ($7.70/ton) and a State fee of $0.66/t or $0.60/ton ($1.00 minimum). Application for the disposal of hazardous wastes, along with $25 processing fee should be submitted to the VRCSD office at least 3 days prior to anticipated disposal date. (See Appendix D for detailed requirements for the disposal of hazardous wastes.)

Prior to July 1, 1975, empty pesticide containers were considered "industrial" hazardous waste and were charged a disposal fee of $8.47/t ($7.70/ton) plus the State fee of $0.66/t or $0.60/ton ($1.00 minimum). Under California regulations, rinsed pesticide containers can be legally disposed of in Class II-1 disposal sites which are suitable for "low risk" wastes. Accordingly, the lowering of the gate fee for empty pesticide containers from $8.47/t ($7.70/ton) to $2.42/t ($2.20/ton) could be justified and was initiated to encourage the use of the site for such purpose (see also discussion below under "Social Problems and Their Mitigations"). According to VRCSD, the current fee schedule is probably insufficient to pay for the actual expenses incurred in the disposal of pesticide containers. However, the benefit derived from the increased use of the site by the agricultural industry in the county is considered to outweigh the monetary loss.

The $20,000/year current lease fee is considered by Moreland Investment Company to be significantly below the going market value for a similar parcel of land in the area. Accordingly, the lease fee would most likely be increased, if a new lease has to be negotiated to permit site expansion and remove certain restrictions in the existing lease agreement (see discussion below under "Anticipated Site Life/Future Use").

Social Problems and Their Mitigations - The Simi site is located in a relatively isolated area and there are currently no residential developments within the immediate proximity of the site. Accordingly, there has not been any public opposition to the establishment and operation of the site. This is in contrast to significant public opposition encountered when Toland sanitary landfill (also in Ventura County) was being established. In recent years public opposition has resulted in the cancellation of two plans to establish a second Class I disposal site in Ventura County.

Prior to July 1, 1975, empty pesticide containers were considered industrial hazardous waste and were accepted at the site only on Wednesdays. The disposal fee was also $8.47/t ($7.70/ton) plus a $0.66/t ($0.60/ton) State fee. Furthermore, as for all hazardous waste which are destined for disposal in Class I sites, the California Waste Hauler Record had to be completed for each load by the hauler and the producer. Some waste generators and haulers considered these requirements to be unduly rigid and, accordingly, took their wastes to disposal sites in adjacent counties where they could get a more "favorable treatment". To encourage waste generators and haulers to use the Simi site, VRCSD contacted the major waste generators in the county and arranged for a meeting (held on June 9, 1975) in which VRCSD explained the reasons for operating the Simi Class I disposal site and solicited suggestions for improving service to the agricultural community within the county. As a result of this meeting, new regulations were drawn which went into effect on July 1, 1975. Under new regulations, (a) empty pesticide containers can be hauled to the site throughout the week during the business hours, (i.e., Monday through Friday, 7:00 AM to 4:30 PM), (b) for a $10 annual processing fee and submission of an "Empty Container Disposal Permit", the hauler can obtain a "blanket permit" for the use of the site during an entire year, and (c) the gate fee is reduced to the regular refuse rate of $2.42/t ($2.20/ton). A blank copy of the "Empty Container Disposal Permit", and the current procedures and requirements for the disposal of industrial hazardous wastes (which include full and partially full pesticide bags and containers and empty containers of extremely toxic and reactive chemicals) are included in Appendix D.

Since the new regulations went into effect, there has been a noticeable increase in the quantity of pesticide containers hauled to the site.

Environmental Considerations - The Simi site is located in a semi-arid area. Soil boring tests made to a depth of 274 m (900 ft) have not indicated the presence of any groundwater. There are a total of five observation wells (12 to 18 m or 40 to 60 ft in depth) on and in the immediate vicinity of the site. These observation wells are inspected on a monthly basis: no leachate formation has been observed at any of the observation wells. Runoff from the site is collected and contained within the site. Because of the very dry climate, and the carefully controlled nature of the operation, there has been no problems with rats, flies, or odor. There have been no explosions, fires, or personnel injuries at the site. Several safety showers are available at the site.

Anticipated Site Life/Future Use - The Class I disposal section of the Simi site has a capacity for approximately 8 more years of operation. The remainder of the site where regular refuse is disposed of will reach its full capacity in approximately 9 years. The lease on the site is for 18 years (i.e., to end by December 31, 1987) or until the site is filled, whichever comes first. Several plans are currently being investigated to extend the life of the site. These include: (a) renegotiating the conditions of the lease or purchase of the land so that current restrictions which prohibit removal of certain hills to expand capacity can be removed; and (b) purchase or lease of an adjacent land to increase site capacity. If a suitable site for landfill can be located in another section of the county, the Simi site may be abandoned when it becomes full.

Neither Union Oil Company nor Moreland Investment Company has formulated a definitive plan for future use of the site after it becomes full. Since Moreland Investment Company is involved in land development and Union Oil Company in oil exploration in the area, the two companies' plans for future use of the site may not necessarily coincide. Several plans which are under consideration include: (a) sale of the property to the City of Simi Valley for the purpose of developing a public park; (b) landscaping and development of a green open space to be surrounded by residential/commercial developments; and (c) construction of a golf course.

CASE STUDY NO. 4

Wes-Con, Inc., Titan Site, Owyhee County, Idaho

Site Location - Owyhee County, Idaho, approximately 16 km (10 mi) northwest of Grand View, Idaho, and 63 km (39 mi) south of Mountain Home, Idaho. The site was formerly known as "Titan 'I' Missile S-2 Mountain Home Air Force Base D-Ida-468A". Figure 4 is the general vicinity map for the disposal site.

Operating Agency - West-Con, Inc., 409 Shoshone So., P. O. Box 564, Twin Falls, Idaho 83301; telephone: (208) 734-7711. Wes-Con is an Idaho Corporation, composed of the following three major stockholders: (1) Gene Pinebold, Twin Falls, former staff member University of Idaho, Manager Agricultural Chemicals, Van Waters & Rogers, Chief Agronomist for Pure Oil Company; (2) Warren Shillington, Twin Falls, owner-manager of Chemical Supply Co., Inc. involving Chemical Sales and Specialized Chemical Application; and (3) Roger Ling, Rupert, Attorney at Law.

History and Background - In 1973, at a discussion meeting at the University of Idaho on control of hazardous waste spills, Mr. Gene Rinebold, then a potato specialist on the University staff, asked a question as to how and where wastes from spill clean-up operation would be disposed of in Idaho in the event of a major accident in the State involving a truck or railroad car transporting harzardous chemicals. Further exploration of the topic clearly indicated a need for a facility (or facilities) in the State where hazardous wastes from all sources (industrial and agricultural) could be contained or safely destroyed.

Because of his military service experience and familiarity with missile sites construction, Mr. Rinebold thought that perhaps deactivated missile sites could be used for containment of hazardous chemicals. Being aware of the Titan missile sites in Idaho which had been deactivated by the Air Force, Mr. Rinebold began inquiring whether any of the sites were for sale. Since a site near Grand View was for sale, this site was

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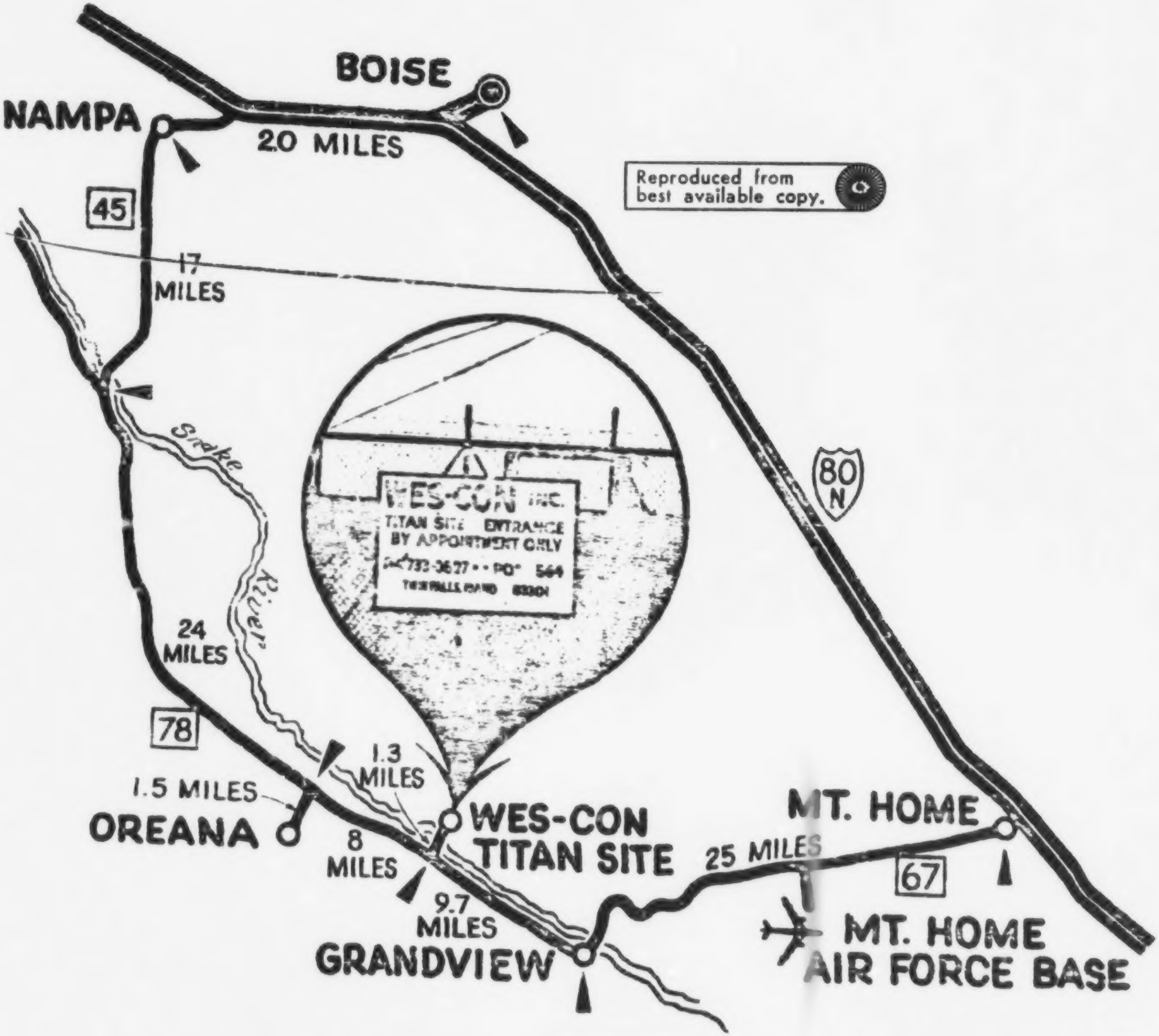

BOISE
NAMPA
20 MILES
45
17 MILES
Snake River
80 N
WES-CON INC.
TITAN SITE ENTRANCE
BY APPOINTMENT ONLY
733-3627 • • PO 564
TWIN FALLS IDAHO 83301
24 MILES
78
1.3 MILES
1.5 MILES
OREANA
8 MILES
WES-CON TITAN SITE
9.7 MILES
GRANDVIEW
25 MILES
MT. HOME
67
MT. HOME AIR FORCE BASE

Figure 4. Vicinity Map for the Wes-Con Site

purchased and Wes-Con, Inc., formally went into operation on November 9, 1973, as a hazardous waste management company.

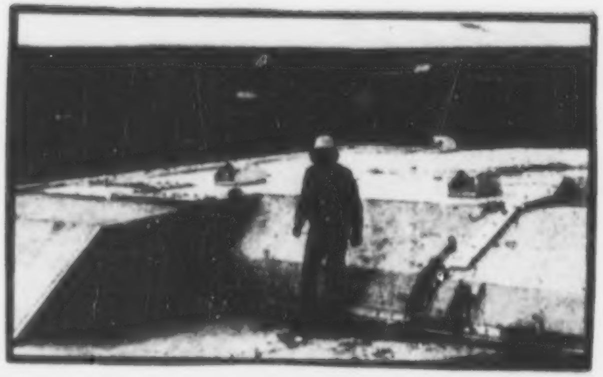
The primary working area at the Wes-Con site consists of a 7-ha (17-acre) former missile launching complex secured by 1,615 lineal m (5,300 ft) of 2-m (7-ft) fencing plus three top strands of barbed wire. This working area is within a 40.5-ha (100-acre) "buffer" area of fee simple ownership. The structures are underground and consist of a series of silos and vaults designed to withstand a ground zero atomic blast (and still remain functional), and capable of containing an internal explosion and fire in the event of accidental ignition of the missile propellant fluid (liquid oxygen). The walls and floors are of concrete which is reinforced with 1.9 cm (3/4 in.) of steel and treated with asphalt emulsion on the outside to withstand complete water immersion and/or containment. The silos are approximately 49 m (160 ft) deep with 1.8-m (6-ft) thick walls and 4-m (13-ft) thick floors. Some photographs of the Wes-Con facility are shown in Figure 5.

The operation at Wes-Con is fairly new and very little of the total site capacity has been utilized to date (see discussion below under "Anticipated Site Life/Future Use"). Most of the activities to date have been related to site preparation; salvage operations involving removal of certain metallic structures (ladder, frames, valves, fitting, etc.) are still continuing. The tunnel entrances and exits to some of the silos are being permanently sealed off so that each silo can be operated independently and for the disposal of a specific class of wastes. The vaults will be used as temporary storage facilities, work areas, or warehouses. The site is currently operated intermittently, depending on business volume. There is a resident attendant at the site and 24-hour surveillance of the site is provided. The site is operated under a license from the Idaho Department of Health and Welfare, Environmental Services Division.

Factors/Agencies Contributing to the Establishment of the Site - As was indicated above, the use of abandoned missile sites for the disposal of hazardous wastes was conceived by Mr. Gene Rinebold and Wes-Con was

WES-CON INC.
TITAN SITE ENTRANCE
BY APPOINTMENT ONLY
733-0887 • • PO 564
TWIN FALLS IDAHO 83301

Main Gate



Encapsulation Covers in Seal Position

Toxic Material Being Lowered Into Vault

Encapsulation Covers in Open Position
(100 t or 110 tons each)

Figure 5. Some Photographs of the Wes-Con Disposal Facility

formed primarily to protect Idaho's environment by developing a safe storage and disposal facility for toxic chemicals and used pesticide containers.

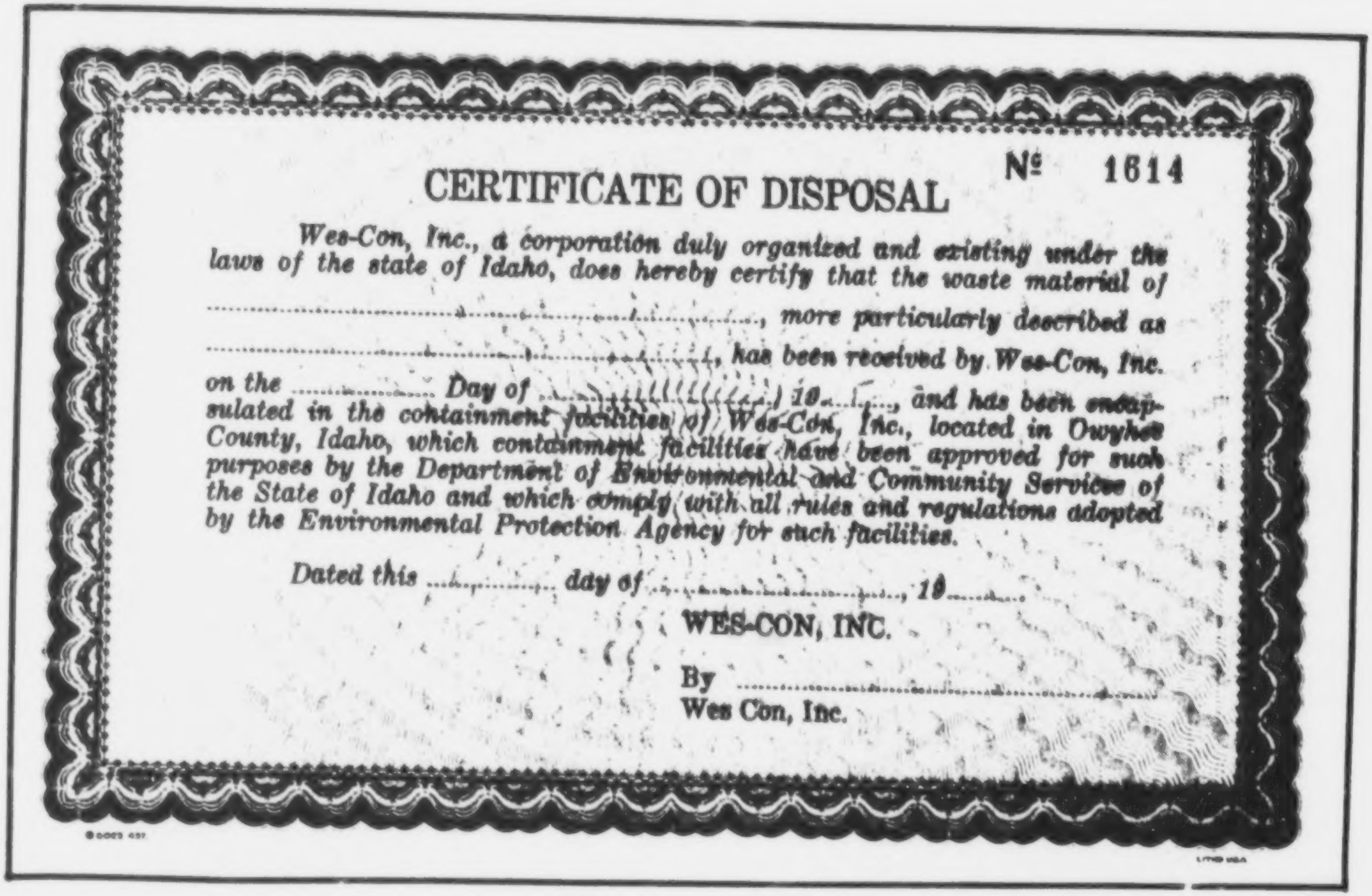
Sources, Nature, Quantity, and Handling of Pesticide Wastes - Wes-Con has been approved by the State of Idaho as a pesticide disposal site and the quantity of pesticides received accounts for about 95 percent of the total wastes handled. The other five percent of the wastes are miscellaneous hazardous wastes, including PCB, laboratory wastes, electroplating sludges, etc. Almost all kinds of hazardous wastes are accepted, except radioactive materials, military poison gas and pressurized gas. Through agreements with major power companies and the Bonneville Power Administration, Wes-Con is currently handling most of the PCB generated within EPA Region X.

The pesticide wastes are primarily pesticide manufacturing process wastes from the Chipman Rhodia plant in Portland, Oregon, and from the Shell Chemical Company plant in Denver, Colorado. (Pesticide containers generated by farmers in Idaho are usually taken to local sanitary landfills.) Non-pesticide wastes originate from within Idaho, other states (mostly neighboring states), and Canada. Most of this business is with the Federal Government. A summary of the total monthly quantity of waste handled is presented in Table 7 for the period of August 1974 through August 1975. It is only since December 1974 that the volume of the waste has been substantial.

The Wes-Con site has been approved by the State as a pesticide waste disposal facility and has a "blanket" permit for accepting pesticide wastes. Disposal of hazardous wastes other than pesticides, however, requires specific State approval which is granted on a case-by-case basis. As a matter of policy, however, Wes-Con keeps a record of all pesticide and non-pesticide wastes which it handles and the records would be available to the State for review upon request. A copy of the "Certificate of Disposal" which is issued to the waste haulers/clients is shown as Figure 6.

TABLE 7
MONTHLY TOTAL WASTE QUANTITIES HANDLED AT THE WES-CON SITE (AUGUST 1974 TO AUGUST 1975)

Month	Waste Quantity t (tons)
1974	
August	40 (44)
September	20 (22)
October	38 (42)
November	20 (22)
December	95 (105)
1975	
January	81 (89)
February	60 (66)
March	133 (147)
April	398 (439)
May	528 (582)
June	558 (615)
July	274 (302)
August	157 (173)



CERTIFICATE OF DISPOSAL № 1614

Wes-Con, Inc., a corporation duly organized and existing under the laws of the state of Idaho, does hereby certify that the waste material of ……………………………………, more particularly described as ……………………………………, has been received by Wes-Con, Inc. on the …………… Day of …………… 19……, and has been encapsulated in the containment facilities of Wes-Con, Inc., located in Owyhee County, Idaho, which containment facilities have been approved for such purposes by the Department of Environmental and Community Services of the State of Idaho and which comply with all rules and regulations adopted by the Environmental Protection Agency for such facilities.

Dated this …………… day of ……………………, 19……

WES-CON, INC.

By ……………………………………
Wes Con, Inc.

Figure 6. Certificate of Disposal Issued for Wastes Accepted at the Wes-Con Site

Wes-Con does not own or operate its own waste hauling trucks. Under agreements with Chipman Rhodia and Shell (two of Wes-Con's major clients), however, hauling of the wastes from these clients is Wes-Con's responsibility. Wes-Con hires commercial waste haulers for hauling in wastes from these two companies. Only licensed commercial waste haulers are admitted to the disposal site. Currently, Wes-Con does not have on-site laboratory facilities for waste analysis and the customers are required to identify the content of their shipment. In most cases, major waste producers send a technical representative along with the waste shipment to assure that the waste load reaches its intended destination and that the waste is disposed of properly. The customers are usually consulted and their recommendations on proper waste handling methods and pretreatment (if any) procedures are solicited. Wastes received at the site are disposed of immediately. The disposal consists of unloading the wastes into one of the silos by Wes-Con employees. The carriers usually pull to within 12 m (40 ft) of the silo and unload into the silo via a steel roller ramp which is set at an inclined angle. A cable or a grasp hook is used to pull the load off the carrier and onto the inclined ramp. The cable is pulled by a truck or tractor located on the opposite side of the disposal opening and in line with the carrier bed. Unloading by hand is generally discouraged. In certain cases, waste containers are lowered into the silo by a crane. During the unloading, the workers are required to wear complete rubber outfits, hard hats and face shields. Oftentimes, a disposable paper cover-all is worn underneath the rubber suit to absorb moisture and keep the body comfortable.

Bentonite clay hauled from a nearby hill on Bureau of Land Management property is added to the silo prior, during, or after waste unloading. The purpose of the clay addition is threefold: (a) to suppress odor, (b) to make a "mud mix" from the liquid waste; and (c) to absorb the free-fall impact of the loads. Water is also added during the disposal operation to suppress dust, to obtain a mud of proper consistency, and to reduce the possibility of spark formation and hence explosion and fire. Water is sprayed into the hole using a fire truck or a battery-operated pump which are available at the site. The quantities of clay and water used vary with the nature and quantity of the waste and with the season. In general, for the same waste about twice as much clay is used in the winter than in the summer. In the winter time the air within the silo is warmer than the outside air and tends to rise to the surface, and hence there is a greater need for odor control. Wes-Con is currently experimenting with two deodorizing chemicals; if a suitable product can be found, the quantity of clay used can be significantly reduced. There is a 914-m (3,000-ft) deep well at the site. Some water from this source has been used in the disposal operation. Wes-Con, however, plans to seal off this well and hauls in water from the outside (because of its poor quality, the well water is unsuitable for domestic use). The fire truck at the site can also generate foam for use in case of fires. Lime is usually added to the silo on an "as needed basis" to effect neutralization/detoxification of certain pesticide wastes. Vehicles used to transport the material to the site are inspected for contamination prior to release. Chemicals, equipment, and procedures are available at the site for decontamination in case of spills, or container leakage.

Sources of Funds and Cost Data - The Wes-Con property was purchased in 1973 from a private party for $25,000. An additional $30,000 has been spent for site preparation, and purchase of equipment (including safety equipment such as gas masks, and respirators). Users charges for the site are usually negotiated on a case-by-case basis. Except for empty pesticide containers which are charged on a different rate schedule, the users fee on the average is between $0.0061 to $0.0077/kg ($0.0028 to $0.0035/lb) of waste. The rates for empty containers are as follows: pick-up trucks, $50; 1-ton trucks, $100; 2-ton trucks, $200; and semi-loads, $450.

The current cost for the operation of the site is about $4,000/month. Up until very recently, the volume of the business was not very substantial and the company was operating at a net loss. Now that the operation has become profitable, Wes-Con anticipates a growing increase in business volume. In the past many of the potential customers had indicated that they prefer to deal with waste disposal companies which are financially sound, as a profitable business is a guarantee to them that the company will stay in business to handle their wastes for at least several years to come. Wes-Con is currently accumulating some funds in a reserve account for dealing with possible emergencies or in the event that future stringent regulations require expenditure of additional funds.

Wes-Con carries a $350,000 liability insurance. Persons entering the disposal site are required to sign the form which releases the company of any liability in case of an accident while on the site. A copy of the form which is used is presented as Figure 7.

Social Problems and Their Mitigations - Wes-Con considers itself a good "citizen" and "neighbor" and makes all attempts to please the local community, its clients, and the county and State agencies. As part of its public relations program, Wes-Con provides a number of specific public services including the following:

1. Free pesticide and container disposal to residents of Owyhee County.
2. Free disposal to approved educational establishments in Idaho.
3. Free disposal, under emergency conditions, for material within Idaho, including highway wrecks when requested by State or Federal agencies.
4. Free disposal for material in Idaho (when ownership can't be established) that may become hazardous to the environment.
5. The facilities will be made available to State and Federal agencies or institutions for experimental studies, schools, and demonstrations for training purposes.

Although it was not required under any applicable regulations, at the very beginning, Wes-Con discussed its waste disposal plan with the Owyhee County Commissioners and solicited their approval. Wes-Con has donated steel stairs, valves, pipes and other material salvaged from the site to local schools, farmers, and private citizens. The company has invited local citizenry and representatives from universities, industry, and governmental agencies to see the disposal site and its operation. To avoid any possible adverse publicity, Wes-Con has intentionally stayed

ASSUMPTION OF RISK AND RELEASE FROM LIABILITY

I, the undersigned, being fully aware of the dangers inherent in going on and about the property which formally constituted Missile Site Titan "I" S2, more particularly described as follows:

> The $W\frac{1}{2}$ of the $NE\frac{1}{4}$ and $E\frac{1}{2}$ of the $E\frac{1}{2}$ of the $NW\frac{1}{4}$ of Section 19, Township 4 South, Range 2 East, B. M., Owyhee County, State of Idaho.

do herby assume all risk of loss, damage or injury to myself or to my property while I am in, on or about said premises.

And I do further release Warren Shillington and Gene Rinebold and their respective partners and affiliated companies, owners of said premises from any and all actions, causes of actions, claims, demands, damages and costs which may or might accrue to me by reason of injury to myself or my property occasioned by my presence in, on and about the above described real property.

Dated this __________ day of _________ 19

____

WITNESS:

____

Figure 7. Assumption of Risk and Release From Liability Form Signed by Individuals Entering the Wes-Con Site

clear of nuclear wastes and nerve gases, even though the site is considered to be most suitable for the containment of such wastes. In reviewing its operation with non-technical persons, the company emphasizes that its operation is primarily aimed at protecting Idaho's environment. The detailed technical aspects of the operation and the fact that a significant volume of the waste currently handled originates from other states are only discussed with the individuals familiar with the technical aspects of hazardous waste management.

As a result of its effective public relations program, Wes-Con has not received public opposition or major complaints from local citizenry (see below for one complaint from a local resident). The site is located at a very isolated and barren area and its operation is not "visible" to the Idaho residents. In one instance one woman residing about 2.4 km (1.5 mi) from the site had complained that the hazardous chemicals and the odor associated with their handling may be harmful to the eagles who may be in the general area. The woman was invited to tour the facility and see for herself that birds still live in silos not used for waste disposal. It was also explained to her that the wastes are sealed and that the birds cannot get into the waste. Before wastes are deposited in operating silos, firecrackers are set off to drive away any birds which may be in the silos. In general, as soon as Wes-Con learns that somebody in the community is suspicious of the operation, the company invites him to the site for a personal tour and inspection.

The name "Wes-Con" stands for Western Containment and was selected to emphasize the positive aspect of the operation. The company intentionally stayed away from such names as refuse disposal, hazardous waste disposal and industrial waste disposal, which were considered to be psychologically less acceptable to the general public than "Wes-Con".

Environmental Considerations - The thick-wall, reinforced concrete construction of the missile silos are considered to be a strong assurance against possible contamination of the subsurface soil. As was indicated above, in addition to clay, lime is added on an "as needed basis" to effect waste neutralization and minimize possible chemical attack and resultant deterioration of the concrete. The groundwater table is approximately 914 m (3,000 ft) below the bottom of the silos. The subsurface soil above the water table contains impervious strata of clay, shale and consolidated cinder beds. The existing well at the site has 904 m (2,965 ft) of 0.58-cm (0.229-in.) steel pipe casing. The water has an artesian head and is very hot. Because of its poor quality, it is unsuitable for drinking, but if its heat content can be economically harnessed, it may be a valuable resource. The area is semi-arid with an average annual precipitation of about 25.4 cm (10 in.) per year.

The vegetation cover in the general area are June grass, Russian thistle, and Salt sage. There is limited grazing in the general area (about one animal per 6 ha or 14 acre) and the area is not suited to row crop farming due to large areas of volcanic ash that will not sustain crops of economic value. The closest source of irrigation water is the Snake River, located approximately 4.8 km (3 mi) north of the site. To obtain its State permit, Wes-Con prepared an environmental impact report which indicated that because of the unique location and characteristics of the site, waste containment in the deactivated silos would have a minimal adverse environmental impact.

At the present time, environmental quality monitoring at the site is limited to measurement of particulates which is done by the State on a periodic basis. A portable sampler is brought to the site to sample the air from the silos. As was indicated above, Wes-Con is currently experimenting with two deodorizing chemicals. In addition to odor control, the use of chemicals can reduce the quantity of clay used and hence would extend the life of the site.

Anticipated Site Life/Future Use - The total capacity of the present Wes-Con site is estimated at about 42,000 m^3 (1,500,000 ft^3). Due to heretofore low volume of business, only about 280 m^3 (10,000 ft^3) of disposal volume has been expended to date. Based on projected future waste volumes and the plans for use of vaults as warehouses, work areas, etc., the anticipated life of the site is estimated at about 10 more years. Wes-Con is in the process of purchasing a second Titan missile site in Idaho for waste disposal, and has started negotiation on possible purchase of a third site.

The Wes-Con operation is essentially in its infancy. The company would very much like to establish facilities at the site for waste recycling, resource recovery, or disposal by other methods (e.g., incineration, or biodegradation of certain non-hazardous wastes by surface disposal). No specific plans have yet been formulated for future use of the facility when the silos become full. The vaults can probably be used as a commercial warehouse. Because of the availability of heat and water from underground (groundwater), the possibility of using the vaults for growing mushrooms has also been considered.

CASE STUDY NO. 5

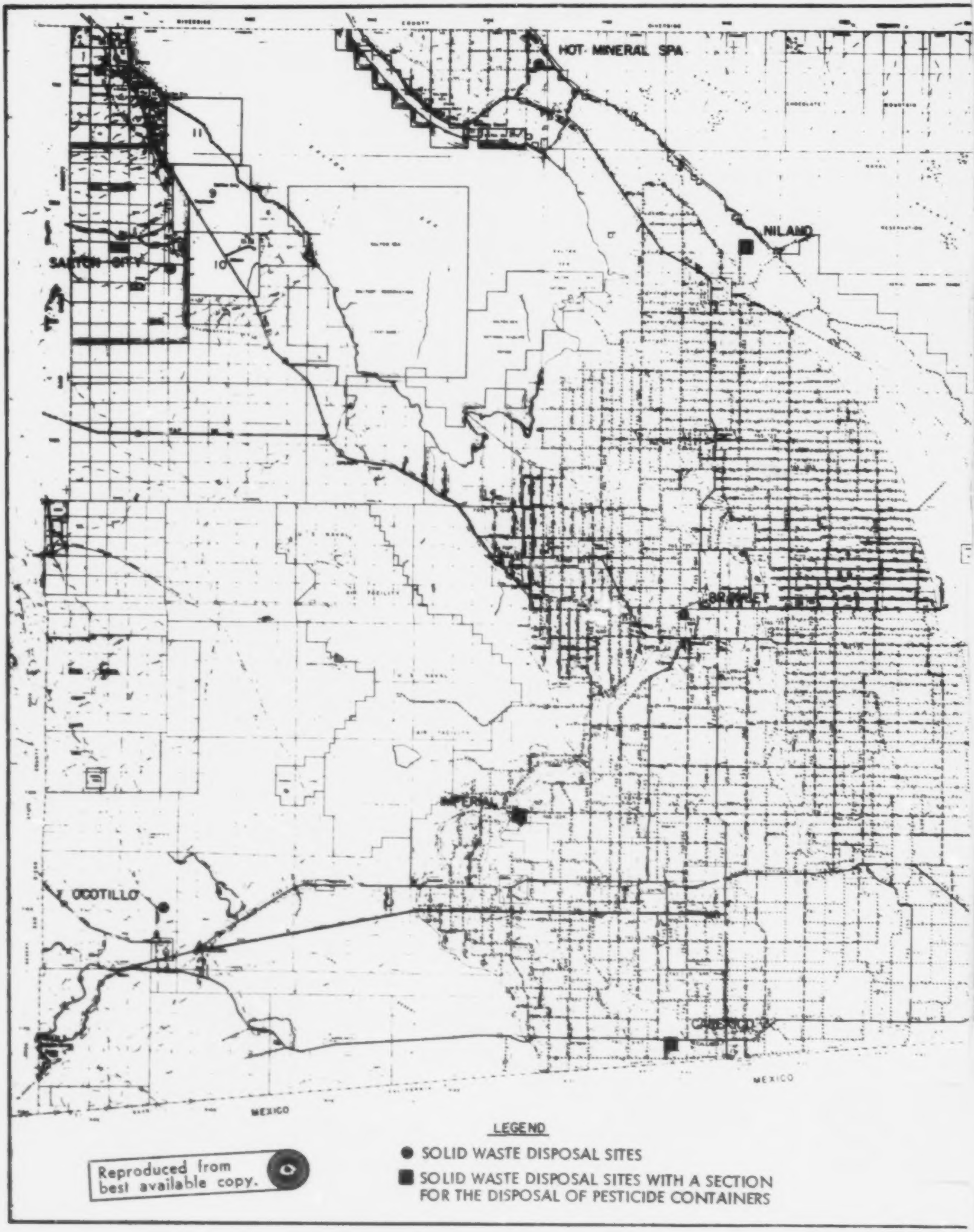
Imperial County Pesticide Container Disposal Sites, Imperial County, California

Site Locations - Imperial County, California (see Figure 8).

Site		Location
Calexico	-	South of Highway 98 west of Calexico adjacent to the New River
Holtville	-	East of the intersection of the East Highline Canal and Norrish Road
Imperial	-	West of Imperial, adjacent to the New River at Worthington Road
Niland	-	Northeast of Niland and north of the East Highline Canal adjacent to Cuff Road
Palo Verde	-	Located southwest of Palo Verde near old Palo Verde Road
Picacho	-	East of Picacho Road, north of the All American Canal in the Bard-Winterhaven Area

Operating Agency - County of Imperial Department of Public Works, Courthouse, El Centro, California 92243; telephone (714) 352-2851.

History and Background - Imperial County operates 10 sites for the disposal of solid wastes generated within the county. These 10 sites provide for waste disposal within a 24 km (15 mi) radius of virtually all permanent inhabitants of the county and within 18 km (11 mi) of the seven incorporated cities of the county. To serve the need of the agricultural industry (see below) and in response to State Water Quality Control Board regulations on disposal of empty pesticide containers, in March 1971 the County of Imperial, in cooperation with the Regional Water Quality Control Board (Region VII, Indio), set aside a special area within six of the 10 county disposal sites for the disposal of empty pesticide containers. These six sites are those listed above under "Site Locations". The pesticide container disposal areas are fenced and are open only one or two days per month and upon special requests (see below). The sites are classified


HOT MINERAL SPA
NILAND
SALTON CITY
BRAWLEY
IMPERIAL
OCOTILLO
CALEXICO
MEXICO
MEXICO

LEGEND

● SOLID WASTE DISPOSAL SITES

■ SOLID WASTE DISPOSAL SITES WITH A SECTION FOR THE DISPOSAL OF PESTICIDE CONTAINERS

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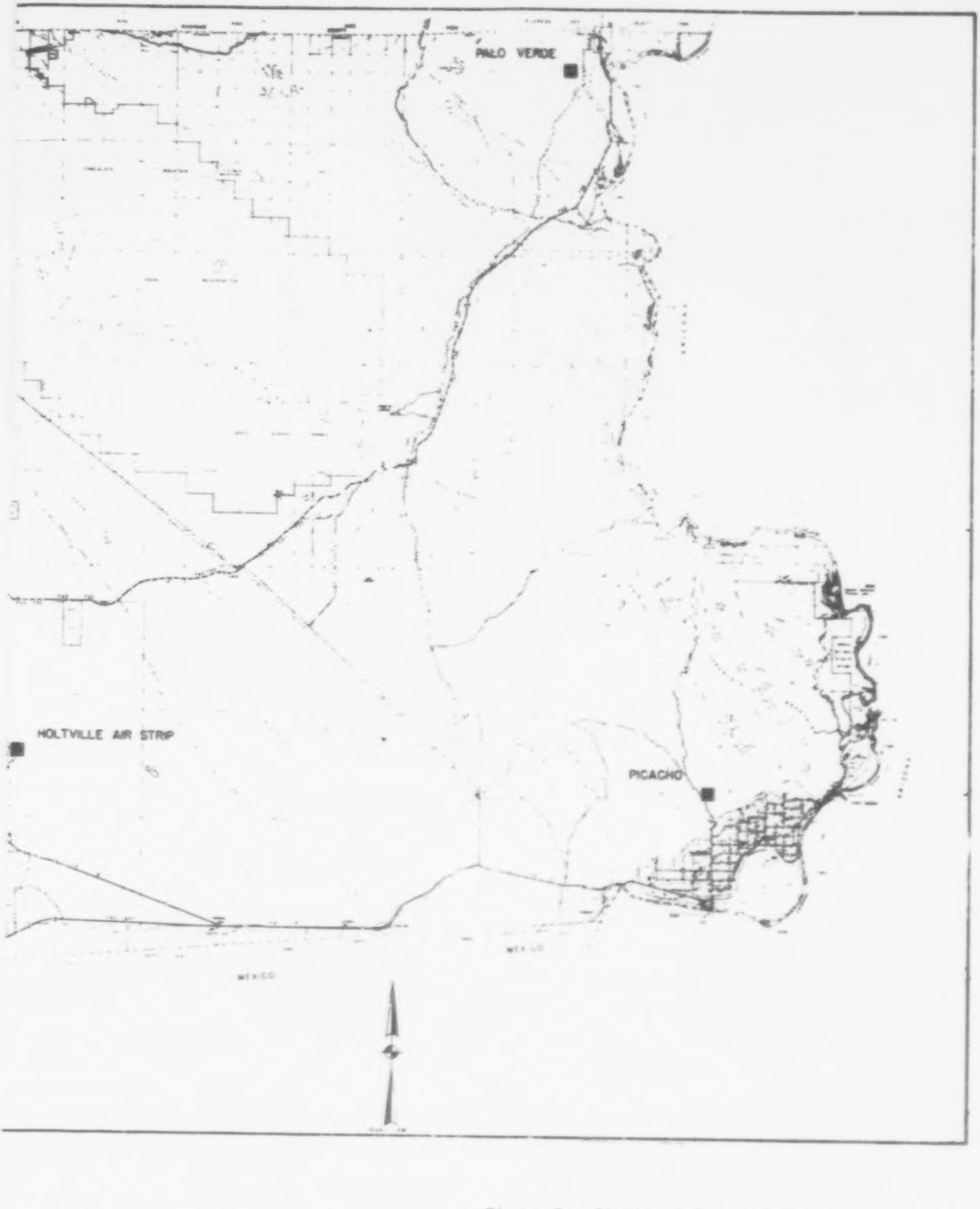

PALO VERDE
HOLTVILLE AIR STRIP
PICACHO
MEXICO
MEXICO

Figure 8. County of Imperial Solid Waste Disposal Sites

as California Class II sites and are approved for the disposal of empty pesticide containers.

Factors/Agencies Contributing to the Establishment of the Sites - Major factors which contributed to the decision by the Board of Supervisors of the Countyof Imperial to create selected areas within the county's dump sites for the disposal of empty pesticide containers were: (a) to serve the waste disposal needs of the agricultural industry in the county; (b) to prevent environmental contamination and to protect the health and safety of the county residents; and (c) to comply with California State requirements for the disposal of pesticide containers in State-approved landfills.

The County of Imperial is a major agricultural county in California and ranks sixth or seventh in the United States in terms of total crop production. The total annual value of the crops produced in the county is estimated at $450,000,000. Each year approximately 20,250 ha (500,000 acres) of land are cultivated. Major crops produced include: lettuce, carrots, cabbage, wheat and small grains, sugar beets and alfalfa. Each year the agricultural industry uses large quantities of pesticides and generates a significant number of empty containers which have to be safely disposed of in order to avoid widespread environmental contamination. Prior to the establishment of the six pesticide disposal sites, empty pesticide containers were accumulated in temporary storage areas on farms or were disposed of in scattered locations throughout the county. Some which were disposed of in the county landfills along with municipal refuse presented potential for fire and explosion and constituted a health hazard to the site operators. Some discarded containers were often collected and used by some individuals for household use.

Under the California waste disposal site classification system (see Appendix B) pesticides and unrinsed containers should be deposited in Class I sites only. Only rinsed pesticide containers and bags and cartons may be disposed in Class II-1 sites, which are a subclassification of the Class II sites.

The six pesticide disposal sites in Imperial County are approved by the Colorado River Basin Region Water Quality Control Board (Region VII, Indio, California) for the disposal of rinsed pesticide containers which have been rendered useless (by puncturing) prior to disposal. These sites are generally considered as Class II sites. Although these sites were selected based on consideration of subsurface geology and the depth to the groundwater, the protection of groundwater is not a major concern in Imperial County, since the groundwater is unusable because of its very high salt content (in excess of 4,000 parts per million). A larger number of possible sites were originally suggested by a committee consisting of the Director of the County Department of Public Works, the County Agricultural Commissioner, and the Farm Advisor. The committee studied a number of possible locations within the county which could be used for the disposal of pesticide containers and selected the existing six sites, based on proximity to major sources of waste generation, environmental considerations, and discussions with the Regional Water Quality Control Board. In the light of additional data which have become available since the Holtville site was placed into operation, this site is no longer considered to be located in the most geologically desirable location and hence will soon be closed and the operation transferred to a different site. The Holtville site is underlain by sandy material and the new site will be located on a dense clay formation.

Sources, Nature, Quantity, and Handling of Pesticide Wastes - Only empty rinsed pesticide containers are accepted at the six disposal sites (Calexico, Holtville, Imperial, Niland, Palo Verde, and Picacho). Wastes which are brought to these sites include 208-liter (55-gal) drums, 114-liter (30-gal) drums, 19-liter (5-gal) and 3.8-liter (1-gal) metal cans, 3.8-liter (1-gal) plastic containers and miscellaneous paper, cloth, glass and plastic sacks. On a number of occasions, pesticide wastes and structural material contaminated with pesticide which had been detoxified or decontaminated (e.g., by treatment with lime and/or Purex) have been accepted at these sites after securing permission from the Regional Water Quality Control Board. All pesticide container disposal sites are securely fenced and the gates locked except at such time when an attendant (from the Department of Public Works) is present at the site to direct the operation. Signs proclaiming the hazard of these sites are prominently displayed in both English and Spanish (see photographs in Figure 9).

The current regulations governing waste disposal in the pesticide disposal sites are:

- Every container is to be empty, rinsed and drained as follows:

  (a) 1) Use the following amount of water or other designated spray carrier for each rinse.

Size of Container	Amount of Rinse Water
3.8-liter (1-gal) or less	1/4 container volume
19-liter (5-gal)	3.8 liters (1 gal)
Over 19-liter (5-gal)	1/5 container volume

  2) Place recommended amount of rinse solution in the container, replace closure securely and agitate.

  3) Drain rinse solution from container into tank mix. Allow container to drain 30 seconds after normal emptying.

  4) Repeat 2) and 3) above a minimum of two times so as to provide a total of three rinses, or

  (b) Other approved rinse methods, at least equal in effectiveness to the above.

  (c) After the final rinse, metal containers should be punctured on the top at the rim to allow remaining rinse solution to drain.

- All containers are to be punctured by the applicators (waste generators) rendering them useless as they are deposited in the dump site and before leaving.

DANGER
KEEP OUT

(a)

(b)

Figure 9. Calexico Disposal Site

(a) English/Spanish direction sign.

(b) Fence surrounding the pesticide disposal area, a danger sign and a sign indicating the operating schedule.

- No actual pesticides, waste pesticide spray residue, liquid and/or soluble industrial wastes or toxic ash are accepted. Containers containing any pesticide in any form or concentration will be rejected and returned to user.

- No empty pesticide containers are to be disposed of at any site unless an attendant is present. All dumping should be directed by the attendant.

Although all the county sites for the disposal of regular refuse are open 24 hours a day, 365 days a year, the six special sites for the disposal of pesticide containers are usually open only 1 or 2 days per month and upon special requests. The current schedule for the operation of the sites is shown in Table 8.

Over 90 percent of the pesticides used in Imperial County are applied by professional applicators and crop dusters. These individuals/companies have found it convenient to use the services of their own employees for hauling containers to the site on days which no crop dusting is done (e.g., on account of bad weather conditions).

Of the six pesticide disposal sites in Imperial County, Palo Verde and Picacho sites have been used very little to date. Only about 250 to 300 cans have been deposited at the Picacho site and less than a dozen have been taken to the Palo Verde site. The applicators which service the Palo Verde area are primarily from the adjacent Riverside County and dispose of their containers elsewhere. Similarly, the Picacho area is served mainly by crop dusters from Yuma, Arizona, and presumably have access to other facilities for waste disposal. Based on waste disposal records to date the average annual volume of containers (uncrushed) deposited in Calexico, Holtville, Niland, and Imperial sites are 204, 302, 411, and 400 m^3 (267, 395, 537, and 653 yd^3) respectively.

With the exception of pesticides designated as "exempt" by the California Director of Food and Agriculture, a permit is required for the agricultural use of any pesticide in Imperial County. To assure that

TABLE 8
PESTICIDE DISPOSAL SITE OPERATING SCHEDULE

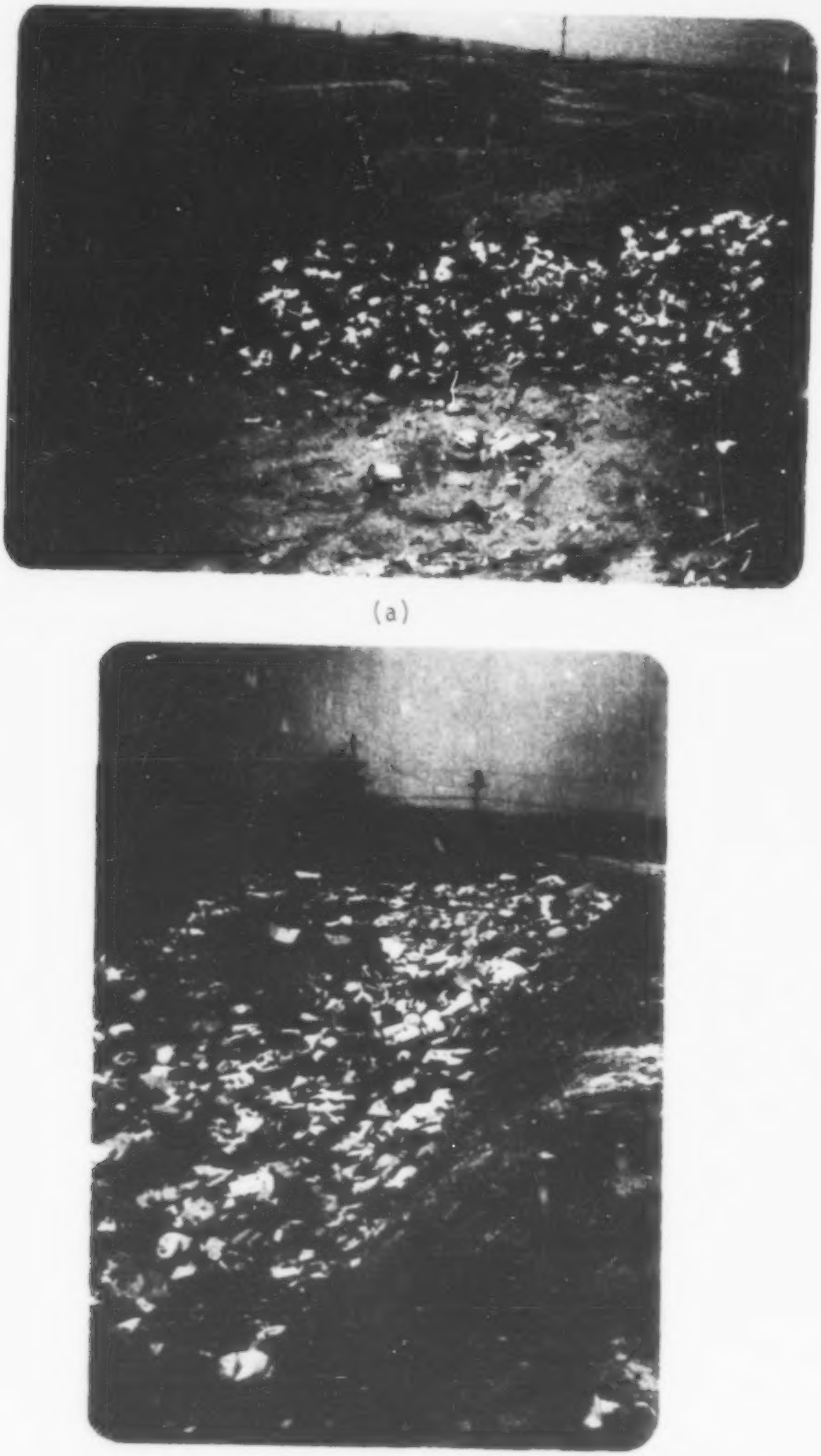
Site	Days of the Month	Time
Holtville	1st and 3rd Tuesday	8:30AM to 3:00PM
Niland	1st and 3rd Wednesday	8:30AM to 3:00PM
Calexico	2nd and 4th Tuesday	8:30AM to 3:00PM
Imperial	2nd and 4th Wednesday	8:30AM to 3:00PM
Palo Verde	Upon Special Request on 1st Tuesday	11:00AM to 3:00PM
Picacho	Upon Special Request on 1st Tuesday	11:00AM to 3:00PM

pesticide containers will not be disposed of at unauthorized sites, on March 16, 1971, the County Board of Supervisors adopted an ordinance requiring the marking of all pesticide containers with the agricultural pesticide dealer's license number and the number of Imperial County Permit to apply pesticides. These markings should be at least 13 cm (0.5 in.) in height, indelible and in plain sight. Thus any pesticide container found at illegal dumping sites can be readily traced to its original owner. When a person has been found to leave pesticides or pesticide containers unattended, that person's permit to use pesticides in Imperial County is cancelled and all pesticide dealers in the County are notified. When such a person has demonstrated that he will remedy such action, he may be issued a new permit by the Agricultural Commissioner.

The general procedure for the disposal of pesticide containers consists of deposition of the wastes in a disposal trench (see photographs in Figure 10) and compaction of the waste with a bulldozer. A cover material consisting of 30 to 46 cm (12 to 18 in.) of dirt is provided at the end of each working (open) day. When a disposal trench becomes full, a new trench is excavated and the operation is transferred to the new trench. So far one trench has been totally filled and covered at the Calexico, Niland, and Holtville sites. An original trench excavated at the Imperial site has not yet been filled to capacity. Because of the very limited use, the trenches at Palo Verde and Picacho remain practically empty.

In the past, several fires have occurred in the pesticide disposal trenches during the site operation. These fires were traced to the presence of residual sulfur in certain discarded paper bags. The mixing and joint handling of these bags with the metal cans were apparently responsible for the fires. To minimize the possibility of such fires, a segregated waste disposal system is currently utilized whereby the metal cans are deposited at one end of the disposal trench and the paper and cardboard material at the other end. No fires have occurred at any of the sites since the new segregated disposal procedure was put into effect.

Sources and Funds and Cost Data - The operation of the pesticide disposal areas within the county landfill sites are tied into the operation of these sites as a whole, and no special separate funds were used or are being used



(a)

(b)

Figure 10. The Operating Disposal Trench at Calexico (a), and Imperial (b) Sites.

for the development and operation of these sites. The total initial cost for the development of six pesticide container disposal sections within the solid waste disposal sites was $4,500 which consisted of the following items:

Fence	$2,500
Trench excavation	1,200
Installation of signs	300
Testing for water	500

Based on the labor hours devoted to site maintenance and operation and the estimated portion of the charges for the maintenance of equipment which may be attributed to the pesticide disposal sections of the landfills, for fiscal year 1974-75 the total direct operating cost for the six pesticide disposal sites is estimated at close to $5,000.

In response to a need for better control of the operation and maintenance of disposal sites within the county to meet the standards established by the State of California, on January 27, 1972, a Joint Power Agreement was signed by the incorporated cities in Imperial County (with the exception of El Centro). The cities signing the agreement are: Brawley, Calexico, Calipatria, Holtville, Imperial, and Westmorland. The agreement provided for:

(1) Funds for a solid waste disposal sites development program.

(2) City funds for the operation of the disposal sites - $2 per capita per annum.

(3) Controls on the development of the sites to comply with State requirements.

(4) Authorization for the County to manage the program, acquire and operate the sites.

The use of the disposal site is free of charge to: (a) all county residents disposing of their own solid wastes; (b) members of the Joint Powers Agreement; (c) State and public utility vehicles; and (d) all vehicles containing empty pesticide containers. All other individuals, companies, or vehicles are charged a disposal fee which varies from $6.00 per load for those trucks larger than pick-up trucks to $15.00 per load for

15-m^3 (20-yd^3) or over "non-packers" refuse collection vehicles. The charges for disposal of solid waste are by permit which can be obtained from the Department of Public Works for no fee. Permittees receive a Load Ticket from the Solid Waste Site Attendant at the disposal site and are billed from the Office of the Department of Public Works at the end of each month by the load count and vehicle size on the tickets. The County Department of Public Works operates the equipment necessary for the maintenance of each disposal site and is responsible for all labor forces. Loads of pesticide containers are specifically exempted from payment of a disposal fee to encourage farmers, crop dusters and ordinary county residents to bring their empty containers to the site for disposal.

Social Problems and Their Mitigations - Pesticide waste disposal sites in Imperial County were developed and are operated primarily to serve the agricultural industry which directly or indirectly provides jobs for the majority of the county residents. Accordingly, the establishment and operation of these sites have been well received and have not encountered any public opposition. The general areas where the sites are located are also very sparsely populated. Periodically there has been some murmurs by some residents expressing unhappiness over the fact that they can no longer use empty pesticide cans as gasoline tanks.

Prior to the use of the current "cut-and-cover" method of landfilling, some solid wastes were disposed of by open burning at the dump sites. The present engineering method of land disposal has been welcomed by county residents, especially those who were located downwind of the burning sites.

Environmental Considerations - The pesticide disposal sites are approved by the California Regional Water Quality Control Board, and are considered to present little potential for environmental degradation. The groundwater in Imperial County is considered essentially useless because of its very high salt content. There is only 8 cm (3 in.) of annual rain and the county has essentially a desert climate. Water for irrigation is brought in from the Colorado River through the All-American Canal. The irrigation return flow discharges to the Salton Sea through the New River and the Alamo River. Minimization of the potential for the contamination of these drainage rivers was a major consideration in selecting the current sites for pesticide container disposal. Prior to the selection of the six sites, test holes were dug to determine the location of the water table. The depth to the water table was 82 m (270 ft) at the Niland site and 2.1 m (7 ft) at the Calexico site. No water was found when the test holes were extended to a depth 6.1 m (20 ft) at Holtville, 15.2 m (50 ft) at Imperial, 15.2 m (50 ft) at Palo Verde, and 4.6 m (15 ft) at Picacho. As was indicated above, in the light of some new data on subsurface geology, the Holtville site will soon be closed and a new site will be opened at a more appropriate location. Currently there are no programs for environmental monitoring on or adjacent to the disposal sites. Except for some fires which have occurred at the sites as a result of mixing and co-handling of metal cans and paper bags containing residual sulfur, there have been no other fires, or any explosions or personal injuries at the sites. The potential for fire has now been eliminated through the use of a system of segregated waste disposal.

Anticipated Site Life/Future Use - The operation of a pesticide container disposal section within a county dump site is tied into the operation of that site as a whole. Although only a limited area within each site is currently fenced off and devoted to pesticide disposal, depending on the capacity requirements, the fence line can be extended to cover an additional section of the site which can be used for container disposal. The actual total site areas, the estimated life of the sites (based on the total quantity of solid waste handled), the original and remaining site capacities, and maximum depth to the fill are shown in Table 9 for the six disposal sites having a section fenced off for pesticide container disposal.

No plans have yet been formulated for the future use of the land when the sites become full. The fenced off areas within which containers have been disposed of will most likely continue to remain locked and inaccessible to the general public. It is planned to prepare and file an official map of the pesticide disposal area to denote the exact area of pesticide container use within the solid waste disposal site. This map filed in the Recorders Office and in the Department of Public Works, will be available for future development of the area.

TABLE 9
AREA, CAPACITY, DEPTH TO FILL, AND ESTIMATED LIFE EXPECTANCY OF SANITARY LANDFILLS

Site Name	Area ha (acre)	Original Capacity m^3 (yd^3)	Remaining Capacity m^3 (yd^3)	Maximum Depth to Fill m (ft)	Estimated Life Expectancy (yr)
Calexico	32 (78)	1,925,400 (2,516,800)	1,747,630 (2,284,480)	6.1 (20)	27
Holtville	16 (40)	394,950 (516,270)	365,330 (477,550)	2.4 (8)	1*
Imperial	24 (60)	1,481,040 (1,936,000)	1,431,700 (1,871,500)	6.1 (20)	20
Niland	32 (80)	789,900 (1,032,500)	770,130 (1,006,700)	2.4 (8)	50
Palo Verde	16 (40)	394,950 (516,270)	375,200 (490,450)	2.4 (8)	20
Picacho	16 (40)	494,700 (646,670)	455,200 (595,040)	3.0 (10)	40

*The Holtville site will soon be closed and the operation will be transferred to a more geologically suitable location (see text).

CASE STUDY NO. 6

Powersville Sanitary Landfill, Powersville, Georgia

Site Location - Powersville, Peach County, Georgia

Operating Agency - County Commissioners of Peach County in association with the City of Fort Valley.

History and Background - The site is a county-operated, state-approved sanitary landfill which has been in use for over 15 years. Since the site was also receiving pesticide wastes, in 1972 a decision was made to fence off a section of the site and to use it solely for the disposal of pesticide wastes. The fenced off section is on a high ground and is protected by about 3 m (10 ft) of dense clay. Access to the hazardous waste disposal area is limited to Woolfolk Chemical Works, Inc., of Fort Valley, Georgia, which is in the agricultural pesticide business. The hazardous waste section is kept locked and immediate dirt cover is provided after each disposal. The entire landfill is about 8.1 ha (20 acres) and the hazardous waste site portion is about 0.2 ha (0.5 acre).

Factors/Agencies Contributing to the Establishment of the Site - As originally operated, the uncontrolled disposal of pesticide wastes in the sanitary landfill posed serious public health hazards stemming from: (a) pesticide dust blown in the face of landfill equipment operators; (b) illegal scavenging activities at the site and potential for removal of pesticide containers/packages for personal use; (c) the unsuitability of major sections of the site for containment of hazardous wastes and potential for groundwater contamination; and (d) difficulties with strict control of the operation including providing immediate cover for pesticide wastes.

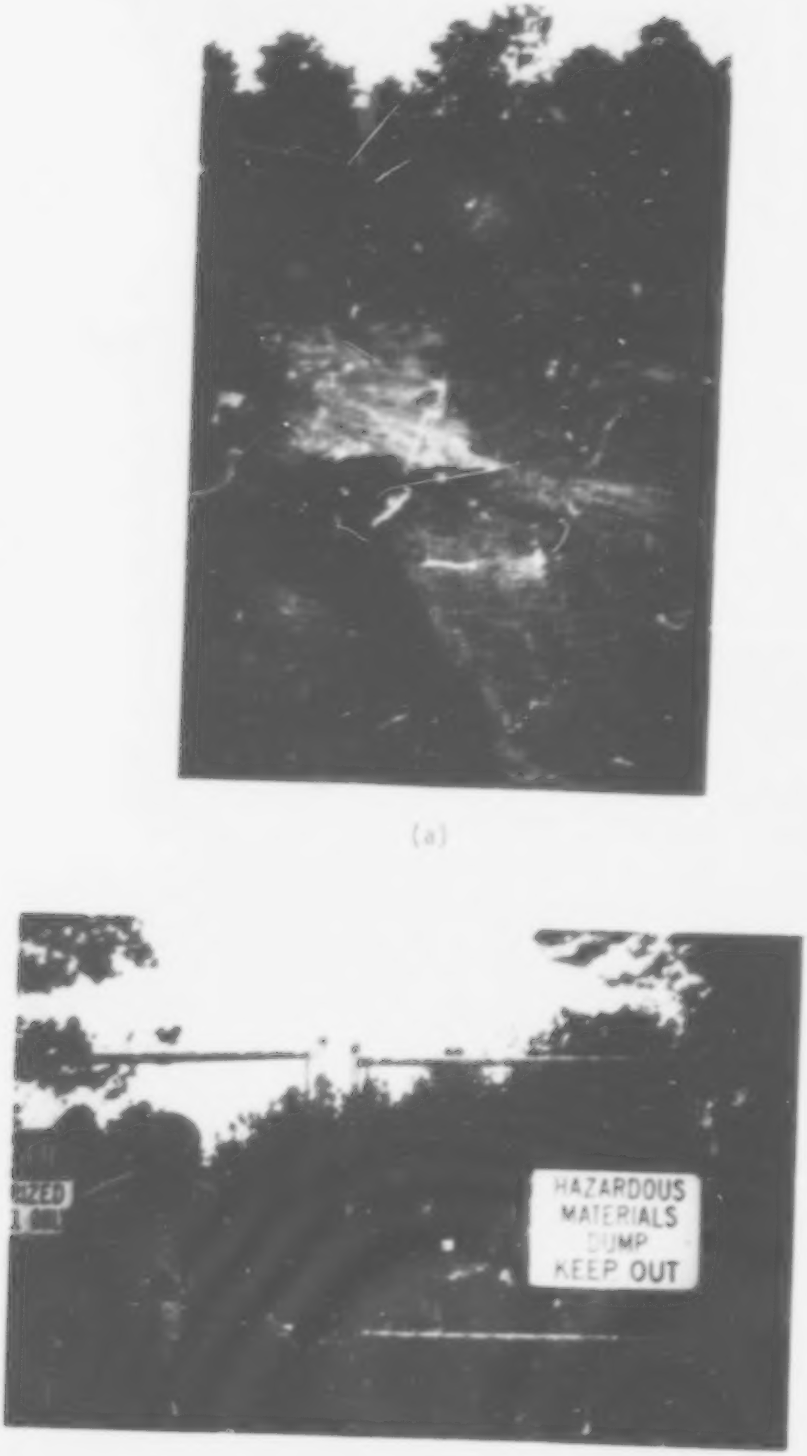
To eliminate the above-mentioned hazards and to provide for effective operational control, the Environmental Protection Division of Georgia State Department of Natural Resources exerted "pressure" to establish a separate hazardous waste disposal section within the Powersville landfill. Both the County and Woolfolk Chemical Works indicated a strong interest in this suggestion and after some discussions agreed to establish a pesticide disposal site within the landfill for use by Woolfolk. The details of the agreement and the specific arrangements for allocating the costs involved were subsequently worked out between Peach County and Woolfolk.

Sources, Nature, Quantity and Handling of Pesticide Wastes - The pesticide wastes disposed of at the site originate from the Woolfolk Chemical Works, Inc., which operates a pesticide formulating plant in Fort Valley, Georgia (about 8 km or 5 mi from the site). Wastes from this plant are primarily empty pesticide paper bags and corrugated boxes which are tied in bundles and hauled to the site about twice every week. Occasionally the waste may also contain damaged containers containing contaminated raw or formulated products. The estimated average volume of each haul (uncompacted) is about 4.6 m^3 (6 yd^3). The plant produces dust, liquid and granular formulation products for agricultural and household use. Chlordane and Sevin are apparently the major pesticides used in product formulation.

When the site first went into operation, Woolfolk, Peach County and the State received numarous inquiries from other companies in Georgia and in neighboring states who wanted permission to dispose of their hazardous wastes at the Powersville site. Except for one occasion when a small quantity of chemical wastes from USDA laboratory was accepted at the site, to date the use of the hazardous waste site has been limited to pesticide wastes from the Woolfolk plant in Fort Valley.

The trench method of landfilling is used for waste disposal in the hazardous waste section and an immediate dirt cover is provided after each disposal operation. When not in use, the hazardous waste section is kept locked. Photographs of the disposal trench and gate and lock system for the hazardous waste section are shown in Figure 11.

Sources of Funds and Cost Data - The final agreement which was worked out between the Peach County and Woolfolk plant required the latter to pay for the cost of site preparation and fencing (estimated at about \$3,000 to \$4,000), and to provide for the hauling of its waste to the site. In return, the county provided the land and agreed to provide free equipment and labor for waste disposal at the site (estimated at about 1 to 2 hours per week). There are no user fees at the Powersville site and the overall cost of landfill operation is apportioned among the various users (cities


HAZARDOUS
MATERIALS
DUMP
KEEP OUT

(a)

(b)

Figure 11. Waste Disposal Trench (a) and Gate, Lock, and Danger Signs for the Hazardous Waste Disposal Section (b) of the Powersville Sanitary Landfill

and the county) according to their waste loads. Woolfolk estimates that the labor which it provides for the packaging and hauling of its waste is about 8 man-hours per week.

The Woolfolk plant employs about 125 persons. The Company is considered important to the local economy and its services are highly valued. The working arrangement whereby the waste from Woolfolk is handled at a public landfill at no extra cost to the Company is considered "equitable" and in the best interest of the community as a whole.

Social Problems and Their Mitigations - When a fence was first put up isolating a specific section within the landfill for pesticide disposal, and warning signs were installed designating the area as a "Hazardous Materials Dump" (see Figure 11), a man residing in a house about 0.4 km (0.25 mi) away contacted the State complaining over the selection of the site for the disposal of hazardous wastes and indicating his concern over the potential environmental implications of the action. The State explained to the man that chemical wastes which will be disposed of in the designated area had been entering the landfill for the past 10 to 12 years and that separate disposal of the pesticide wastes in an isolated section of the landfill is primarily aimed at containment of the operation and protection of the groundwater and adjacent land. The argument was convincing and the man even agreed to periodically visit the site and report to the State if the disposal operation is not carried out in accordance with State recommendations. On one occasion the State received a call from this man indicating that the waste material had not been covered properly. The State immediately contacted Woolfolk and the landfill operator and the situation was corrected.

Aside from the above-mentioned incident, there has been no major complaint concerning the operation of the site. One resident in the area recently wrote to the Region IV EPA office in Atlanta complaining about the operation of the Powersville site. The complaint has been turned over to the State which has in turn referred it to a landfill inspector for investigation. The complaint refers to the lack of daily dirt cover on the refuse disposal section of the landfill, however, and does not involve the hazardous waste disposal operation. There have not been any accidents, fires, or explosions at the hazardous waste portion of the site. There has been a history of occasional small fires in the refuse disposal portion of the site. Cover material which is stockpiled at the site is usually used to put out these small fires.

Environmental Considerations - To minimize groundwater contamination, the trenches in the hazardous waste disposal section were required to have 3 m (10 ft) of impervious clay protection. Surface runoff from adjacent land is prevented from entering the site by proper grading and use of diversion ditches. There are no monitoring/observation wells at the site and no data are currently available on the distance to the groundwater table. The new State guidelines for the management of hazardous solid wastes (developed in July 1974), would require borings to determine soil character, sites and depth to the groundwater table, and installation of at least one groundwater monitoring well at the site. In general, hazardous wastes disposed of in a landfill are to be covered immediately with at least 15 cm (6 in.) of compacted earth. As required by regulations under Section 8 of the Federal Insecticide, Fungicide and Rodenticide Act as amended, Woolfolk keeps a record of the quantity of waste which it hauls to the Powersville site; upon request, the record would be available to the State for inspection. Like other state-approved landfills, the Powersville site is inspected every three to six months by a State landfill inspector who reviews the operation of the site and assigns a numerical "grade" to the environmental adequacy of the operation.

Anticipated Site Life/Future Use - The operation of the hazardous waste disposal area within the Powersville site is tied into the operation of the site as a whole. The overall anticipated life of the site is limited by the availability of adequate cover material. Unless some adjacent property is purchased to obtain sufficient cover material, the anticipated life of the Powersville site would not probably extend beyond an additional five years. Through the purchase of an adjacent land, the operation can probably continue for another 25 years. At the present time, no plans have been formulated for future use of the site.

Miscellaneous - There are about 20 pesticide formulation plants in Georgia of which the Woolfolk operation at Fort Valley is the largest. The Fort

Valley plant is also the only formulating facility which disposes of its waste in a limited access site within a sanitary landfill. No such arrangements exist for wastes from other formulating plants which are generally disposed of in state-approved, general-purpose landfills. The unique arrangement at the Powersville site has proven successful and the State is exploring opportunities for designating similar areas within other suitable landfills for the disposal of pesticide and other hazardous wastes. The current plan calls for establishment of eight to 10 such sites in Georgia.

It is estimated that close to one million pesticide containers are generated in Georgia each year. The State strongly advocates the recycling of large containers in accordance with recommended procedures,[9] and the 208-liter (55-gal) containers are largely recycled. At the Woolfolk plant, the drums containing raw chemicals are largely used for the shipment of the formulated products. Woolfolk gives credit to farmers who bring in their pesticide containers for refill provided that they sign a form releasing Woolfolk from any possible liabilities. According to State regulations, all containers taken to sanitary landfills must be triple-rinsed.

Since considerable quantities of waste pesticides have been placed at the Powersville site, the State is very much interested in any in-depth field study which can document the fate of the pesticides in the soil and evaluate the possible impact of pesticide disposal on groundwater quality.

CASE STUDY NO. 7

Concrete Culverts for Pesticide Waste Encapsulation in Sanitary Landfills, State of Mississippi

Site Location - Seventeen state-approved county sanitary landfills in Mississippi.

Operating Agency - Various counties.

History and Background - There are currently a total of 56 state-approved public sanitary landfills in the State of Mississippi. In 17 of these landfills, concrete containers have been installed for the disposal of arsenic pesticides which are no longer used on cotton crops. The system which uses ordinary construction culverts for containerization is somewhat unique and was engineeered and its use advocated by the Division of Solid Waste and Vector Control of the Mississippi State Board of Health. The program was initiated early in 1975.

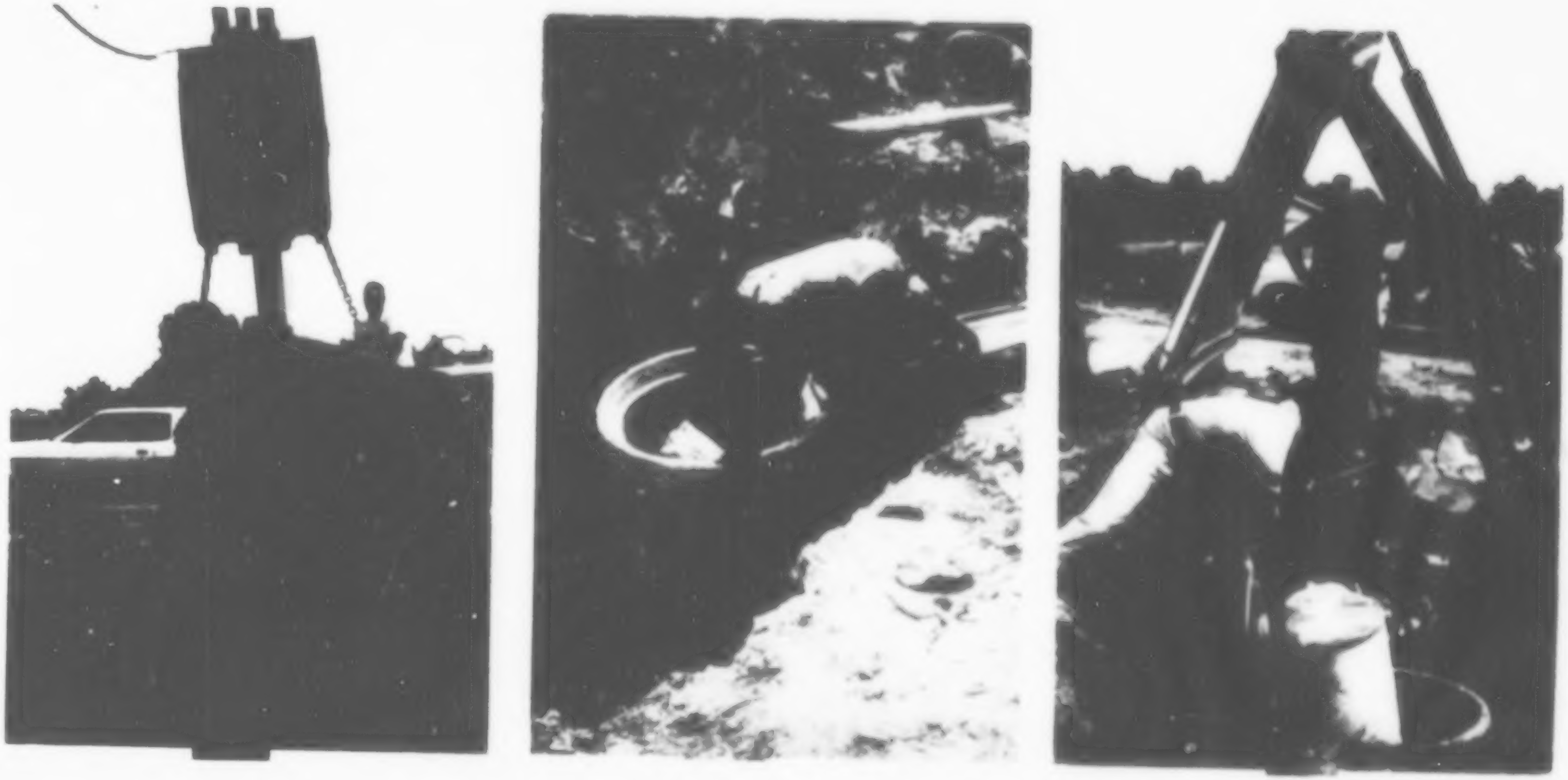
Factors/Agencies Contributing to the Establishment of the Site - The major single reason for the installation of concrete containers within sanitary landfills for the encapsulation of hazardous wastes was the protection of the health of the general public and the landfill operators. Because of a USDA ban on the use of calcium arsenate on cotton crops, some farmers were left with small quantities of this chemical which had to be safely disposed of. The concrete containment system was developed to provide for safe disposal of the limited quantities of arsenic pesticides held by individual farmers, and hence to eliminate the possibility of environmental contamination through indiscriminate and inappropriate dumping or disposal methods. The system was engineered and its use advocated by the Solid Waste and Vector Control Division of the Mississippi State Board of Health. The Division also provided technical direction for the construction and operation of the units.

Sources, Nature, Quantities and Handling of Pesticide Wastes - As was indicated above, the concrete containers which have been installed in the sanitary landfills are primarily for the disposal of limited quantities of calcium arsenate. Before it was banned by USDA, calcium arsenate was widely used on cotton crops for boll weevil control. (Cotton is the dominant crop in Mississippi; about 80 to 85 percent of all insecticide applications in the State is for cotton.) Through a program of advertisement and public education, the people have been informed that facilities are available for safe disposal of any stored calcium arsenate, and people are now bringing the old material to the designated landfills for disposal. In some of the landfills, limited quantities of DDT have also been disposed of in the concrete encapsulation systems. Although the landfill operators keep a record of the quantity of wastes placed in the concrete containers, the data have not been analyzed to determine the total amount of waste contained in each unit.

The concrete containment capsules are made of ordinary construction culverts which are installed in a vertical position in the landfill. To increase the capacity of a capsule, several culverts are often placed on top of each other to form a deep containment "well" in the landfill. The bottom culvert sits on a 7.6 to 10.2 cm (3-4 in.) thick cement slab which is poured before the culverts are lowered into the "well". The joints between the bottom culvert and the base and between overlying culverts are sealed with cement. The top culvert usually extends about 30 to 46 cm (12-18 in.) above ground. Most units currently in use are provided with a metal lid which is supported on a frame structure. The cover can be secured with a lock when the system is not in use. When a container becomes full, it is cemented on the top and the operation is transferred to a new container. Depending on the diameter of the culvert, the wall thickness of the containers may vary from 5.1 to 7.6 cm (2 to 3 in.).

Several photographs showing the actual installation of the containment culverts, deposition of waste into the containers and the metal support and cover structure are shown in Figures 12 and 13.

Sources of Funds and Cost Data - In Mississippi, the Boards of Supervisors of various counties and municipal officials are responsible for the collection of solid wastes and design and operation of public landfills. There are currently very few private waste disposal contractors in the State. The source of funds for the establishment and operation of the county landfills are county ad valorem taxes. There are no gate fees for the use of the



(a) (b) (c)

Figure 12. Installation of Concrete Culvert Containers (a, b) and Actual Deposition of Waste in a Container (c).

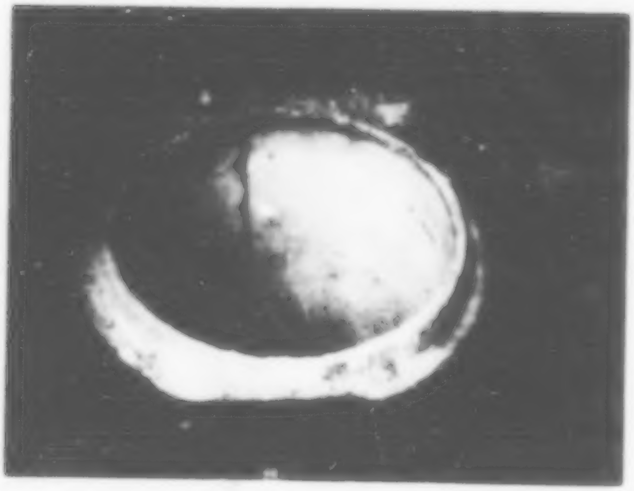


Figure 13. Metal Frame Support and the Cover and Lock System for Concrete Culvert Containers

sites. The County Board of Supervisors feels that a free disposal service will encourage people to bring their wastes in for proper disposal.

The costs associated with the installation and use of the concrete encapsulation culverts are probably a small fraction of the total cost for the establishment and operation of the sanitary landfills. The exact cost for the installation of a culvert container has not been determined. Although judging from the simple construction of the system and the relatively inexpensive nature of the construction material used, the cost for the construction of a culvert container would probably be less than $1,000.00.

Social Problems and Their Mitigations - Concrete encapsulation program is a very new program in Mississippi. To date there has been no known public opposition to the installation and use of the concrete containers. The sites in which concrete containers are installed are not identified as hazardous waste disposal sites and hence they do not arouse public curiosity and concern. Originally, some of the sanitarians and landfill operators were against the concrete encapsulation program. The State, however, convinced them of the value and practicability of the program and solicited and obtained their cooperation.

Environmental Considerations - Concrete containers installed in the sanitary landfills are considered as temporary containment facilities, pending the development and availability of more suitable methods for the disposal of hazardous wastes. Since concrete containers are subject to chemical attack and deterioration in a landfill environment and may possibly be cracked during installation, the State plans to install a monitoring system around each container to detect possible leaks so that corrective measures can be immediately implemented. As was indicated above, the culvert containers are equipped with a cover and lock system which can secure the unit (and also keeps the rain water away) when the unit is not in use.

Anticipated Site Life/Future Use - The use of concrete containers for the disposal of pesticide wastes is considered only a temporary measure and when a more suitable method is developed, the material contained in the concrete containers will be removed and disposed of accordingly. The containers have been installed essentially for the disposal of limited quantities of calcium arsenate which were left over after the chemical was banned for use on cotton. When all the calcium arsenate material held by farmers and residents are collected, there probably will not be a further need for the construction of additional containers. At the present time, when a concrete culvert container becomes full, a new container is constructed and the operation is transferred to the new container.

Miscellaneous - Mississippi State Solid Waste Management Program is a new program and was initiated only 3 years ago. Prior to the development of the program, solid wastes including empty pesticide containers were dumped in rivers, along roads and river banks, and in scattered locations throughout the State. The State (Solid Waste and Vector Control Division of the Board of Health and the Bureau of Environmental Health) initiated an extensive campaign of public education persuading the public and the major waste generators to take their wastes to the state-approved sanitary landfills or deposit them in refuse collection containers ("pitch-in" boxes, see Figure 14a) which were placed by counties and municipalities at strategic locations to serve areas where regular refuse collection service was unavailable. The pitch-in boxes are 3 to 4.6 m^3 (4-6 yd^3) in volume and are placed at such locations as major crossroads, new construction projects, etc. so that no waste disposer has to drive more than a few kilometers (miles) to reach the nearest disposal container. On the average, there is one container for every 150 individuals. The containers are emptied twice a week (and more often in areas where the containers tend to fill up more quickly) and the content taken to sanitary landfills. There are 52 state-approved sanitary landfills in Mississippi.

It is estimated that about 13,605 t (15,000 ton) A.I. of insecticides (mainly methyl parathion and toxaphene), between 4,535 and 6,800 t (5,000-7,500 ton) A.I. of herbicides and less than 454 t (500 ton) of fungicides were applied in Mississippi in 1974.[10] The estimated numbers of various types of insecticide containers used in 1974 are as follows: 90,900 208-liter (55-gal) metal drums; 24,000 114-liter (30-gal) metal drums; 334,000 19-liter (5-gal) metal drums; 620,000 3.8-liter (1-gal) glass and plastic containers;

and 180,700 other types of containers. Thus a total of 1,249,600 containers were used in 1974 for insecticides alone. The number of containers would have been significantly more had it not been for the use of bulk pesticide tanks (1,893 to 18,930-liter or 500 to 5,000-gal capacity) which are placed by a number of chemical companies on large farms for use by area farmers. The product is metered directly from the tanks and the tanks are refilled as necessary by the chemical companies.

Under current solid waste disposal regulations, pesticide containers should be triple-rinsed, crushed and buried in approved sanitary landfills. Larger containers, such as 114 and 208-liter (30 and 55-gal) drums may be sold to reconditioners. Disposal of unused pesticides and pesticide wastes are referred to the Bureau of Environmental Health and are handled on a case by case basis.

Individuals using small quantities of pesticides usually deposit their 3.8, 19, and 57-liter (1, 5, and 15-gal) metal drums in the solid waste ("pitch-in") collection containers which are located throughout the State. Larger pesticide users which may generate a greater number of containers are encouraged to take their empty containers directly to approved sanitary landfills. The State has initiated a program for the collection and recycling of large (e.g., 114 and 208-liter or 30 and 55-gal) metal containers. The program involves establishing "holding sites" within sanitary landfills where users can leave their empty containers when a landfill is open. When a sufficient number of drums are accumulated, a cooperage company is called in to pick up the drums for reconditioning. The money derived from the operation is given to the Boy Scouts or charity organizations and this provides an additional impetus for the pesticide users to participate in the program. In 1974, about 700 drums were collected in a holding site which was established in a sanitary landfill serving two delta counties. The State plans to extend the recycling program to all landfills.

The "North-West Jackson" site is the largest sanitary landfill in the State. The site is considered suitable for the disposal of hazardous wastes and has accepted wastes such as soil contaminated with pesticides and spill clean-up chemicals. When an incident involving the contamination of chicken feed with dieldrin was discovered in a chicken farm in Mississippi, about 9 million chickens had to be sacrificed. The remaining quantity of contaminated feed was brought to and disposed of in the North-West Jackson site. The site is located over a 91.4-m (300-ft) thick dense clay and is considered to provide adequate containment for hazardous chemicals. A portion of the site which has been filled and covered is now planted and converted to an "environmental park" for use by the public (see Figure 14b).

The State has just completed a state-wide hazardous waste survey and hopes to utilize the data on waste quantities and characteristics as a guide for the selection, design, construction and operation of two to three centralized facilities for the disposal of hazardous wastes. The calcium arsenate wastes which are now temporarily encapsulated in concrete containers in sanitary landfills will probably be removed and transferred to these hazardous waste facilities for ultimate disposal.

ENVIRONMENTAL
PARK

(a)

(b)

Figure 14. "Pitch In" Containers for Waste Collection (a) and Environmental Park Developed on Recovered Land from a Sanitary Landfill Operation

CASE STUDY NO. 8

Wheeling Disposal Site, Andrew County, Missouri

Site Location - Andrew County, Missouri; about 9.7 km (6 mi) north of St. Joseph and 1.6 km (1 mi) southeast of Amazonia.

Operating Agency - Wheeling Disposal Service Co., Inc., 1805 South 8th Street, St. Joseph, Missouri 64503

History and Background - The site is a 97-ha (200-acre) parcel acquired in 1970 by Wheeling Disposal Service Co., Inc. for development as a disposal facility for both municipal and industrial wastes. Portions of the site had been used for the disposal of municipal refuse and some industrial wastes (primarily wastes from a local tannery). With the passing of the Missouri Solid Waste Management Law, all disposal sites are required to receive operating permits from the State Department of Natural Resources.

Wheeling has retained Emcon Associates (San Jose, California) as consulting engineers on site development and related studies. A geotechnical feasibility investigation by Emcon in 1973 indicated that the site could be developed as a disposal facility in accordance with regulatory agency requirements. The report on the study was reviewed by the Missouri State Division of Health which concurred with the findings subject to submission of supplementary data on subsurface soil testing and preparation of detailed engineering plans, specifications and operating procedures. The supplementary data were submitted to the State on December 12, 1974, in an Emcon report entitled Supplemental Geotechnical Investigation and Disposal Site Design Report for Wheeling Disposal Site. The supplemental data were reviewed by the State and in August 1975 the site was formally approved for disposal of municipal/industrial wastes.

Factors/Agencies Contributing to the Establishment of the Site - Wheeling's decision to accept pesticide wastes was based on its desire to remain a "full service" disposal company and to serve the needs of industrial clients within its service area of St. Joseph, Missouri.

Sources, Nature, Quantity and Handling of Pesticide Wastes - To date all the pesticide wastes accepted at the site have been from a local pesticide formulation/packaging ("tolling") company. Under normal conditions, solid wastes generated at these facilities are small in quantity and limited primarily to waste cartridges and empty containers. However, when the Wheeling disposal site became available for the disposal of pesticide wastes, the local company disposed of outdated products, clean-up materials and used containers which had been accumulated over the years. Most of the wastes which have been taken to the disposal site to date consist of steel drums, mixed emulsifiers, de-registered products and miscellaneous chemicals (e.g., in one instance, some old soda ash). The rate at which the wastes have been hauled to the site has varied. Data for one week of operation indicate the following quantities: 5,000 208-liter (55-gal) drums, 945 liters (250 gal) of mixed emulsions, and 76 m^3 (100 yd^3) of outdated products. When the local company clears its warehouses of unwanted chemicals and accumulated wastes, the quantity of wastes from the company which will be regularly hauled to the site will be very small. (The drums are washed with a caustic solution, rinsed with water, and crushed prior to hauling to the disposal site.)

The site development plan for the Wheeling disposal site is shown in Figure 15. A section within the area designated as "Solid Waste Disposal Trench Area" is currently used for the disposal of pesticide wastes. The deposited wastes are immediately covered with 61 cm (24 in.) of dirt.

Sources of Funds and Cost Data - Wheeling Disposal Service Co., Inc., is a private company and company funds were used to purchase and develop the disposal site. Information on the purchased price of the land, engineering and site development costs, and the users fee for pesticide disposal charged to a local company are not disclosed. In general, for containerized hazardous wastes, and depending on the quantity of the waste handled, the users fee may vary from $5 to $30/bbl. Wheeling Disposal Service provides the hauling service for the transport of the pesticide wastes to the disposal site.

Social Problems and Their Mitigations - When the site first went into operation, a number of area residents contacted the State inquiring about

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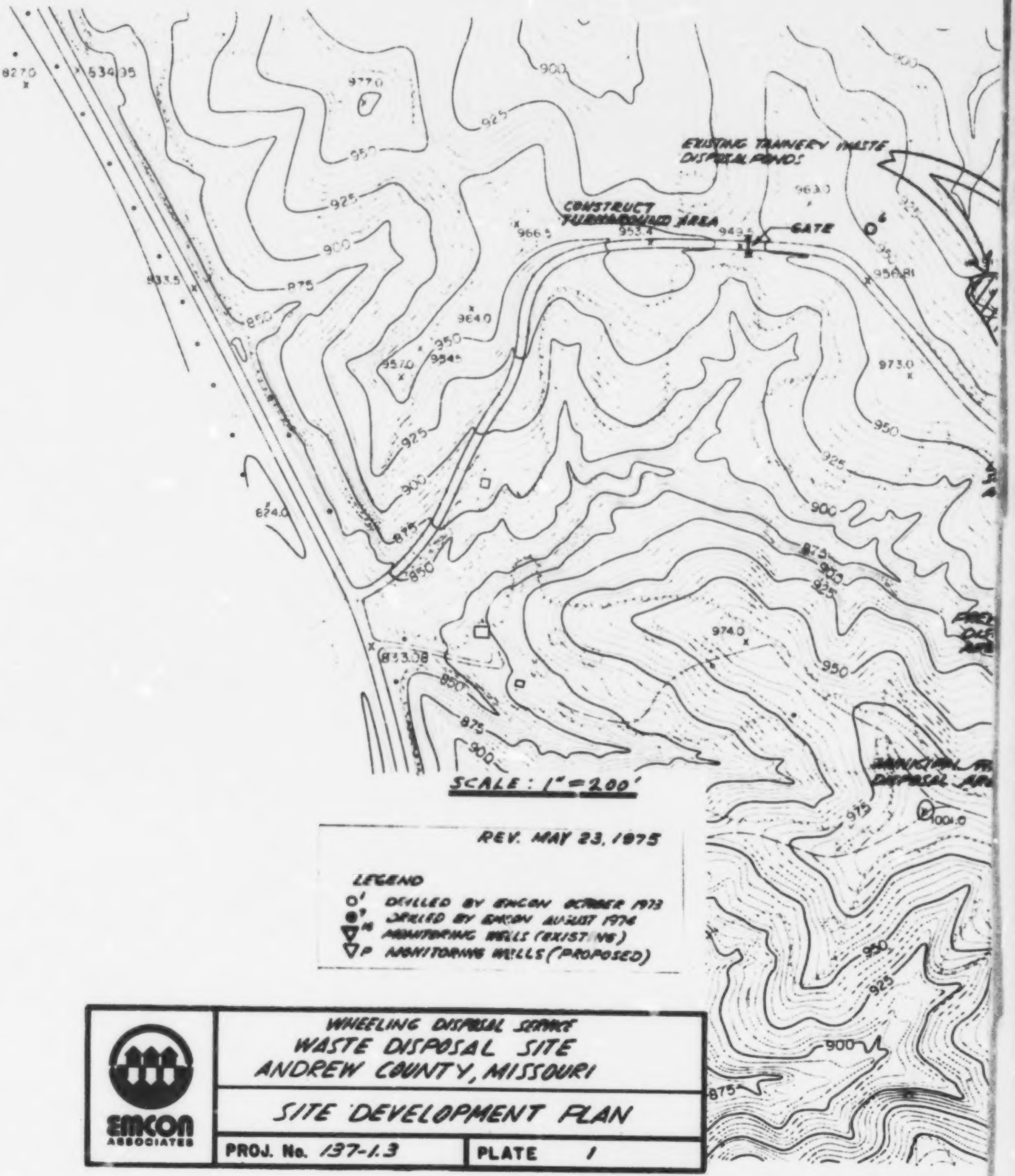
827.0
834.95
977.0
900
925
950
925
900
875
850
833.5
EXISTING TANNERY WASTE DISPOSAL PONDS
CONSTRUCT TURNAROUND AREA
966.5
953.4
949.5
GATE
963.0
956.81
964.0
950
957.0
954.5
973.0
925
900
875
850
824.0
900
875
900
925
974.0
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833.08
850
875
900
975
1001.0
950
925
900
875

SCALE: 1" = 200'

REV. MAY 23, 1975

LEGEND
○¹ DRILLED BY EMCON OCTOBER 1973
●⁹ DRILLED BY EMCON AUGUST 1974
▼ᴹ MONITORING WELLS (EXISTING)
▽ᴾ MONITORING WELLS (PROPOSED)

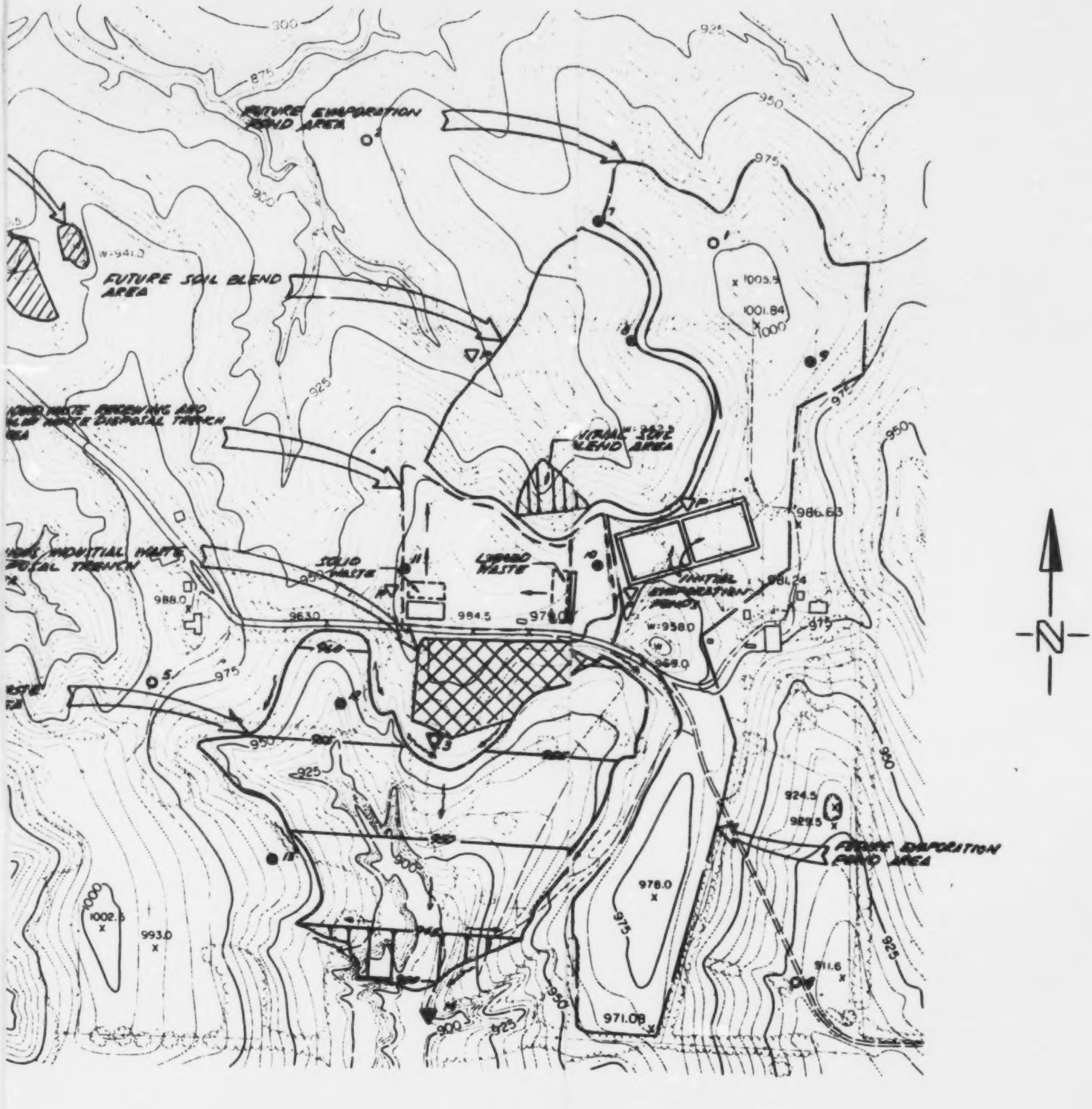
EMCON ASSOCIATES

WHEELING DISPOSAL SERVICE
WASTE DISPOSAL SITE
ANDREW COUNTY, MISSOURI

SITE DEVELOPMENT PLAN

PROJ. No. 137-1.3

PLATE 1



FUTURE EVAPORATION POND AREA
FUTURE SOIL BLEND AREA
SOLID WASTE
LIQUID WASTE
INITIAL EVAPORATION PONDS
FUTURE EVAPORATION POND AREA
SOIL BLEND AREA
INDUSTIAL WASTE
DISPOSAL TRENCH
N
900
875
925
950
975
1000
W-941.0
1005.9
1001.84
986.63
981.24
988.0
963.0
984.5
W:958.0
978.0
971.08
924.5
929.5
911.6
1002.5
993.0

Figure 15. Site Development Plan for Wheeling Disposal Site

the nature of the operation and the precautions which were being taken to adequately safeguard the quality of groundwater and adjacent lands. These inquiries were satisfactorily answered by the State which briefed them on the geological studies which indicated the suitability of the site for waste containment, and on the State requirements for site design and disposal operation. At one time, one resident in the area suspected that its well was contaminated with leachates from the disposal site; a sample of water from this well was tested by the State and found satisfactory for domestic use.

Environmental Considerations - The site development plan for the Wheeling disposal site (Figure 15) is based on engineering and field investigations by Emcon which has identified the ridge tops as the most preferable areas for the disposal of industrial wastes and the southerly opening canyon in the central portion of the parcel as the most suitable area for disposal of municipal refuse in a sanitary landfill operation.

Figure 15 also indicates the locations of test borings which are drilled to obtain data on the characteristics of the subsurface formation. The eight supplemental borings (solid circles in Figure 15) which were drilled in August 1974, indicated a minimum of 7.6 m (25 ft) thickness of relatively impervious clay (permeabilities ranging from 10^{-9} to 10^{-7} cm/sec) in areas proposed for waste disposal. The clay layer is expected to provide excellent hydraulic barriers to infiltration of surface waters and for containment of waste in disposal trenches. Test borings have indicated the presence of groundwater 11 to 12 m (36 to 40 ft) from ground surface in borings 7, 8, and 9. No groundwater was encountered in borings 10, 11, 12, and 13, which were drilled to depths ranging from 7.6 to 11 m (25 to 36 ft) from ground surface. Boring 14, drilled in the valley base, below the proposed municipal waste disposal area, encountered groundwater approximately 3 m (10 ft) from ground surface.

The engineering plan for the development of the site calls for installation of a system for interception and collection of leachates from the sanitary landfill, interception and diversion of surface run-off from adjacent areas, and development and implementation of a monitoring-surveillance program. As indicated in Figure 15, two monitoring wells have been installed and four additional monitoring wells are planned. The two existing wells extend to a depth of 11 m (35 ft), and the four wells which are planned will extend to a minimum of 3 m (10 ft) below the layer where the wastes are placed. The surveillance program will include inspection of the monitoring wells on a quarterly basis for leachate formation; if leachates are found, samples of the fluid will be collected and analyzed for specific constituents as recommended by the State.

The area where pesticide wastes and containers have been buried will eventually be filled and covered to above the existing ground surface. Currently, each time a waste load is deposited, it is immediately covered with 61 cm (24 in.) of a clay cover soil. Wheeling Disposal Service keeps a record of the quantity and type of pesticide wastes which are deposited at the site. Upon request, the record will be available to the State for inspection.

Anticipated Site Life/Future Use - Since the disposal operation at the site has been initiated only very recently, sufficient data are not yet available to make a reasonable estimate of the anticipated incoming waste loads and hence the expected life of the site. Because of the very infant nature of the operation, no specific plans have yet been formulated on possible future use of the site when its capacity becomes fully utilized.

Miscellaneous - The disposal of pesticide wastes in a state-approved sanitary landfill is a new undertaking in Missouri. Since operation at the Wheeling disposal site has just begun, sufficient data have not yet been generated to judge the effectiveness of the operation and the nature and extent of socio-economic and political problems which would be associated with any large-scale landfill operations, specifically those involving disposal of hazardous wastes.

The State of Missouri is currently involved in developing a program in hazardous waste management. At the present time, because of lack of appropriate regulations and absence of centralized facilities for the disposal of hazardous wastes, most farmers and pesticide formulators are apparently either stockpiling their empty pesticide containers or disposing of them in the farms and/or sanitary landfills.

CASE STUDY NO. 9

Browning-Ferris Industries, Inc. Landfill, Darrow, Louisiana

Site Location - Near Darrow, Louisiana; on State Highway 75, approximately 0.8 km (0.5 mi) from Mississippi River.

Operating Agency - Nelson Industrial Services, Inc. ("BFI-Baton Rouge"), a wholly-owned subsidiary of Browning-Ferris Industries, Inc.

History and Background - Browning-Ferris Industries, Inc. ("BFI") is the largest waste systems company in the United States and has landfill operations in many states. The site near Darrow, Louisiana, occupies a long strip of land about 21 ha (52 acres)in size and is surrounded by a number of major chemical and petrochemical production facilities (Allied Chemical, Borden, Uniroyal, BASF Wyandotte, Rubicon, Vulcan Materials, Dow Chemical, Monochem, etc.). BFI-Baton Rouge purchased the site in July 1972 from a private individual who had purchased the site 6 years earlier from another private individual. The site previously had been operated as a sanitary landfill; it was not designed as, nor intended to be, a pesticide disposal site. BFI-Baton Rouge has State approval to accept a maximum of 23 kg (50 lb) of a pesticide waste which is contained in empty packaging material from an industrial plant (see below).

When BFI-Baton Rouge purchased the site in 1972, there were a total of six disposal pits on the site, ranging from approximately 0.12 to 0.20 ha (0.3 to 0.5 acre) in size. Of these, only one pit currently is in use; another has only recently been excavated and is about to begin accepting wastes. One pit which had been used as a depository for a nonpesticide industrial liquid waste is being emptied, with the material being taken by a company in Alvin, Texas, and used in the production of a low-sulphur fuel. As of September 1975, approximately 1.1 million liters (0.3 million gal) of the 18.9 million liters(5 million gal) of this waste contained in the pit had been pumped out and hauled to Texas. The remaining pits have been landfilled with dry trash, covered with dirt, graded, backfilled with soil and planted with grass to give the area a park-like appearance. There is an access road from the highway. The road passes through the facility and terminates at the active pit at the far end of the property.

Factors/Agencies Contributing to the Establishment of the Site - The site in Darrow was purchased by BFI-Baton Rouge as part of the BFI's nationwide expansion program and also in response to the waste disposal needs of the industrial complex in Southern Louisiana.

Sources, Nature, Quantity and Handling of Pesticide Wastes - Under its current permit from the State, BFI-Baton Rouge facility accepts only industrial dry trash, nonhazardous, nontoxic solid wastes (corrugated boxes, rags, office refuse, process sludges, warehouse and lunch room wastes, etc.). Only a small quantity of pesticide waste which is contained in dry trash from one industrial client is disposed of at the site at the present time. This, however, is with the approval of the State which permits the site to accept from a plant approximately 40 km (25 mi) away, empty packaging which had contained maleic hydrazide. This dry waste contains approximately 0.4 percent maleic hydrazide, or about 2.2 kg (4.8 lb) per 5.4-t (6-ton) load. BFI-Baton Rouge has state approval to accept a maximum of 23 kg (50 lb) per month of the residual maleic hydrazide contained in this empty packaging material. These small quantities are considered by the State to be "nontoxic" and "nonhazardous" and, thus, are in compliance with permit requirements. The maximum of 272 kg (600 lb) of maleic hydrazide which may be accepted at the site in a year represents an insignificant fraction of the total of 8,698 t (9,600 tons) of wastes which are handled at the site each year. BFI-Baton Rouge officials state they will not accept any significant quantities of pesticide-containing wastes at this site; any that may be accepted in the future will be with the knowledge and consent of appropriate State agencies.

Prior to BFI-Baton Rouge's acquisition of the site, a total of 907 t (1,000 tons)of a chlorinated solvent waste, containing 75 percent hexachlorobenzene (HCB) had been accepted by the then operators of the site during 1970-71 from a chemical plant in Plaquemine, Louisiana. Since, as a chemical commodity, one use of HCB is in the formulation of certain seed protectants, HCB-containing wastes may thus be considered as pesticide waste. The HCB waste was originally deposited in two 38 x 38 m (125 x 125 ft) pits. When these pits were filled, they were covered with dry trash to a depth of 0.6 m (2 ft), and that, in turn, was covered with 0.6 m (2 ft) of compacted soil.

In 1973, after these pits had been closed, covered, and no further HCB was being received, there was an episode of widespread HCB contamination of land, air and livestock in Southern Louisiana. Ten facilities, including the BFI-Baton Rouge waste disposal site, were suspected as possible sources of contamination. Investigations by the State determined that the BFI-Baton Rouge site was a very minor and insignificant source of contamination; other sites, none of which were owned or operated by BFI, proved to be the major contributors to this pollution incident. However, BFI and the customer from which it had received the HCB-containing wastes initiated a clean-up operation, including removal of the dirt and trash covers from the pits and their replacement with a new cover, consisting of a total of 1.83 m (6 ft) of fresh, compacted soil. A 0.025-cm (10-mil) sheet of polyethylene film was placed approximately at the middle depth of the soil cover.

As previously indicated, there is only one pit currently active at the BFI-Baton Rouge site. Industrial wastes (predominantly dry trash) are hauled to the site in vehicles owned by BFI-Baton Rouge, with all pesticide-containing wastes transported in enclosed truck bodies. The active pit currently is filled to ground level, and it is planned to continue the operation to landfill this area to an elevation above ground level, give it a final cover of fresh topsoil, and seed it with grass. Waste deposited at the site is compacted daily with a bulldozer and covered with 15 cm (6 in.)of compacted dirt at the end of each day of operation.

Although there are no laboratory facilities at the site, before any new types of materials are accepted, BFI-Baton Rouge requests State approval to do so. There are no facilities for waste storage at the site.

Sources of Funds and Cost Data - In 1972, BFI-Baton Rouge acquired the site (land, improvements and disposal equipment) as part of a larger acquisition. An additional $126,000 was subsequently spent for site improvements, including construction of drainage ditches to collect run-off water from the site (Southern Louisiana is characterized generally by low topographic elevations and high annual rainfall). The fee charged for hauling and disposal of the wastes containing the very small quantity of maleic hydrazide is $75.00 per load, or $13.70/t ($12.50/ton). The customer which generated the waste containing 75 percent hexachlorobenzene contributed almost $30,000 to the cleanup operation in 1973.

Social Problems and Their Mitigations - With the exception of the suspected involvement in the HCB-contamination episode in 1973 discussed earlier, there have been no problems or public opposition related to the BFI-Baton Rouge site.

Environmental Considerations - The BFI-Baton Rouge site is located in a region of flat, low-elevation terrain and high annual rainfall. Considerable efforts have been made and are continuing to assure proper site drainage. There is currently a sump and drainage ditch for the collection and diversion of the run-off water. The soil in the general area is classified as silty clay loam. The entire property is fenced off from the surrounding pastures.

Currently, air sampling of the area including the BFI-Baton Rouge site is conducted by the Louisiana State Air Control Commission approximately every 4 months. Drainage water is inspected for the presence of leachate by the Louisiana State Stream Control Commission every 90 days. Periodic site inspections are also conducted by the Louisiana State Health Department.

Anticipated Site Life/Future Use - To date only 4.9 ha (12 acres) of the 21-ha (52-acre) parcel have been used for waste disposal (including pits used by previous owners). Based on the anticipated volume of business, it is estimated that the BFI-Baton Rouge site will provide service for an additional 20 years. As was indicated above, disposal pits used previously have been covered and planted with grass to give a park-like appearance. Any pits excavated for future use will also be covered with dirt and planted when landfilling operations are completed. As presently visualized, when the operation at the site is terminated, the area would be a green area elevated about 1.8 m (6 ft) above the surrounding terrain.

The BFI-Baton Rouge site has received requests from certain industries in the area for the disposal of liquid chemical wastes. One such request from a local company has been for the disposal of waste "neu-oil" used as a detergent to clean pipes. None of this material, or other industrial liquid waste, has been or will be accepted at the site.

CASE STUDY NO. 10

Des Moines Metropolitan Area Solid Waste Agency (Metro) Sanitary Landfill, Polk County, Iowa

Site Location - Polk County, Iowa, 16 km (10 mi) east of the City of Des Moines (Section 7, Twp. 79, R25).

Operating Agency - Des Moines Metropolitan Area Solid Waste Agency; 3121 Dean Street, Des Moines, Iowa 50309; telephone (515) 265-8106.

History and Background - In 1967, under a demonstration grant from the U.S. Public Health Service, Department of Health, Education and Welfare (now, the Office of Solid Waste Management Programs, EPA), the City of Des Moines, Iowa, undertook a comprehensive study and analysis of solid waste collection and operations in the Des Moines metropolitan area, and developed recommendations for a regional system for the collection and disposal of solid wastes.[11] Under a follow-on demonstration grant, the Des Moines Metropolitan Area Solid Waste Agency (Metro) was created in July 1969 as a single agency to provide solid waste management services on an area-wide basis and to replace the individual programs of several governmental entities.[11]

Metro is a self-supporting organization, designed to operate much like a public utility. The Agency is run under the authority of a 16-member Board representing 15 cities (each represented by one Board member), and Polk County (one Board member). Member agencies which comprise the Metro are listed in Table 10.

Although Metro was created in 1969, the actual operation of the existing Metro landfill did not start until 1972. The current site is 162 ha (400 acres) in size and serves an area of 1,554 km^2 (600 mi^2). The Metro site is essentially a large sanitary landfill which handles primarily municipal refuse. The quantity of pesticide wastes handled at the site is negligibly small (see below).

Factors/Agencies Contributing to the Establishment of the Site - Prior to the creation of Metro, solid waste management in the Des Moines area was splintered among more than a dozen separate jurisdictions, with

TABLE 10
GOVERNMENTAL JURISDICTIONS OR POLITICAL UNITS WHICH COMPRISE DES MOINES METROPOLITAN AREA SOLID WASTE AGENCY

1. City of Altoona
2. City of Ankeny
3. City of Bondurant
4. City of Clive
5. City of Des Moines
6. City of Grimes
7. City of Norwalk
8. City of Urbandale
9. City of West Des Moines
10. City of Windsor Heights
11. City of Mitchelville
12. City of Runnells
13. City of Elkhart
14. City of Johnston
15. City of Polk
16. Unincorporated townships in Polk County, including Crocker, Webster, Saylor, Delaware, Clay, Four Mile, Allen, Bloomfield, Walnut, part of Douglas, and part of Franklin.

waste collection through various municipal, contract and private systems, and with disposal operation conducted at ten dumps scattered throughout the area. The City of Des Moines metropolitan area, the largest solid waste generator in the region, was generating approximately 509,730 t (562,000 tons) of solid waste per year. This quantity of solid waste was projected to almost double by year 1990. Faced with such an anticipated large increase in the quantity of solid waste, and the inefficient operation of the existing waste collection and disposal systems, the City of Des Moines solicited and received Federal grants to study, develop and implement a regional plan involving establishment of a single solid waste agency and program to replace the individual programs of several governmental entities and hence provide for a more efficient collection of the waste and its disposal in a properly located and operated site.

At present there are three other disposal sites and one transfer station permitted in Des Moines. Of the three disposal sites, only two are operating at present, and they dispose of construction and demolition waste only. The transfer station accepts mainly industrial, wood pallets, cardboard, etc., and is disposed in a permitted disposal site in Madison County, about 64 km (40 mi) from Des Moines. The City of Des Moines operates a tree disposal site and two other disposal site permit applications have been filed with the Iowa Department of Environmental Quality.

Sources, Nature, Quantity, and Handling of Pesticide Wastes - Wastes handled at the Metro disposal site are essentially all municipal/commercial refuse. With the exception of about 7.65 m^3 (10 yd^3) of pesticide wastes from Helena Chemical Company, which is brought to the site each week, any pesticide wastes or containers received at the site are incidental and would probably originate in household use. Compared to a total of 18,000 m^3 (23,000 yd^3) of solid waste which is handled at the site each week, the waste from Helena Chemical Company is negligibly small. Helena Chemical (headquartered in Memphis, Tennessee) operates a contract pesticide formulation plant in Des Moines. The formulated products are primarily herbicides and insecticides, with a smaller quantity of fungicides. The waste material consists of paper bags, cardboard boxes and 19-, 114- and 208-liter (5-, 30- and 55-gal) containers. The paper bags and cardboard boxes are compacted into a dumper and the metal containers are hauled to the disposal site by a commercial hauler.

In general, Metro is very cautious as to the kind and quantity of hazardous wastes which it accepts at the site. In the past, and as a matter of policy, it has turned down requests for the disposal of large quantities of hazardous wastes. Requests for the disposal of smaller quantities are referred to the Iowa Department of Environmental Quality (IDEQ) for review and advice. If the IDEQ indicates that the waste can be safely handled and should be accepted at the site, the waste will be accepted. In general IDEQ requires that a waste generator provide a fairly detailed description of the waste before a request for disposal can be processed. A copy of the "Report of Hazardous Waste" which the waste generator is required to complete is shown as Table 11. Two examples of recently approved requests for disposal of hazardous wastes are a request from a Diamond Shamrock laboratory for the disposal of small quantities of Ramrod (2.3 kg or 5 lb), atrazine, and Rotox (request approved on May 1, 1975); and a request from Farmers Grain Company (Carlisle, Iowa) for the disposal of 3,000 empty containers (request approved on June 17, 1975).

Under a contract with the City of Des Moines, Metro has been providing once-a-week backyard collection and hauling service for 60,000 single and four-family residences within the city. All other Metro members provide their own arrangement for waste collection and only utilize Metro's service for waste disposal. As a result of a recent decision by the Des Moines City Council, effective January 1, 1976, the City of Des Moines will take over Metro's waste collection service for the city. Since currently a large portion of the Metro's income is from the waste collection/hauling service, the loss of this business to the city is considered to reduce Metro's income significantly.

The Metro site is open for business six days per week. The disposal method is "cut-and-cover" with a cover of 30 to 40 cm (12 to 18 in.) of dirt provided at the end of each working day. Sections of the landfill completely filled with solid waste are graded to promote run-off, covered with low permeability soil and provided with surface trenches as required.

TABLE 11
HAZARDOUS WASTE CHARACTERIZATION DATA REQUEST FORM

Include: REPORT OF HAZARDOUS WASTE

1. Quantity of waste in terms of total volume or weight of over-all material.
2. Where over-all waste may be broken down into several different waste mixtures, give weight or volume quantities of each.
3. Composition of each mixture specifying:
   a. Chemical Composition
   b. Physical state of mixture, i.e., solution, suspension, powder, etc.
   c. Possible or existing impurities.
4. If dissolved or suspended, give vehicle.
5. Toxicity if known, of every component or other hazard.
6. Solubility if product is unusual or carries only a trade-name.
7. Manufacturers name and address if known. Expecially necessary where only a trade-name is available with no chemical data.
8. Distributor name and address where known, especially for products bearing only a trade-name.
9. Mode of transport of material and packaging type and condition prior to disposal.
10. Suggest method or methods of disposal available.

In addition:

11. Is future use of material a possibility?
12. May the material be used in its original intended fashion to effect disposal?
13. Can it be returned to manufacture for disposal or recycling or can it be recycled on a local basis?
14. Has any disposal action been taken to date?
15. What are previously employed methods of disposal?

Return to: Michael L. Hanson, Ph.D.
Hazardous Substance Section
Iowa Department of Environmental Quality
3920 Delaware Ave. - P. O. Box 3329
Des Moines, Iowa 50316

A movable litter fence is used to control litter and blowing paper. Any litter which has lodged against the peripheral fence or which has been blown beyond the fence, is picked up daily or as often as required to maintain an acceptable standard of appearance and sanitation. Surface water is diverted around the area being filled and any accumulation of water in excavated trenches is drained or pumped out before solid waste is placed in the trench.

Sources of Funds and Cost Data - There has been no Federal or State support for site development or current operation of the site. The initial capital investments and annual operating revenue were financed through revenue bonds. The required annual operating cost including the debt service on the bonds is raised from fees charged by the agency for collection and disposal services rendered to the member communities . A monthly fee of \$3.25 per resident is charged by Metro for the once-a-week backyard collection service in the Des Moines area. Other member agencies have their own collection fees based on negotiated rates with private waste collectors/haulers. The gate fee is currently \$0.98/m^3 (\$0.75/yd^3) of compacted or loose refuse. The disposal fee for non-member agencies is 150 percent of the rate for the member agencies i.e., \$1.46/m^3 (\$1.12/yd^3); to date, however, there has been no identifiable load from a non-member city.

Social Problems and Their Mitigations - Initially the actual start of the operation of the Metro site was delayed by about two years because of opposition by local residents and property owners (mostly from the Town of Pleasant Hill) who feared that the operation of the landfill would result in devaluation of their property and could attract rodents. It was also asserted that debris which would fall off the refuse trucks en route to the disposal site could litter roads and the vibrations due to the passing trucks could be damaging to the structures. A petition which was originally submitted by residents in Pleasant Hill and some neighboring communities against the operation of the site carried 2,260 signatures. The complaints were taken all the way to the Iowa Supreme Court before the site operation could be formally initiated.

Aside from the initial public opposition to the establishment and operation of the site, there have been no significant complaints against site operation. At one time there were some citizen complaints asserting an abundance of rats in an area near the site. The presence of rats, however, was traced to a hog-feeding operation in an adjacent location.

The original Metro plan called for the construction of two disposal sites. The construction of a second site on the western side of the service area which would have eased the "pressure" on the currently used site, however, has not materialized due to strong public opposition.

Environmental Considerations - The location and operation of the Metro site meets the very stringent requirements for solid waste disposal set by the Iowa Department of Environmental Quality's Solid Waste Disposal Commission. The requirements are purposefully stringent since about 78 percent of the water in the area is derived from groundwater. The Metro site is underlain by about 61 m (200 ft) of dense glacial clay. The movement of groundwater is in the southwesterly direction and at the southwest corner of the property there are 13 observation wells which extend to 3 to 6 m (10 to 20 ft) below the base of the operation. Iowa State University has a monitoring program whereby the observation wells are sampled every three months and the water samples tested for certain water quality characteristics.

The Metro site operates under a permit from IDEQ. The site is inspected once every six months by the County Health Department and two or more times every year by IDEQ. To date there has been no incidence of fires, explosions, or personal injuries at the site. Several times there have been cases of drums containing paint thinner which were received in a load of refuse and which splashed over the landfill equipment. As a matter of policy, no waste drums are accepted at the site unless the drums are empty or contain material which will not be damaging to the equipment.

Anticipated Site Life/Future Use - The Metro site is estimated to provide seven to eight more years of service. The tentative plan is to convert the site to a golf course when it becomes full. To date about 20 percent of the land parcel which has been filled has been contoured and has been planted as an interim measure.

Miscellaneous - The disposal of pesticide wastes and pesticide containers is a problem of significant magnitude in Iowa. Because of certain isolated incidents of fires and personal injuries which reportedly have occurred in a number of landfills in the past, most public landfills are very hesitant to accept pesticide wastes and pesticide containers. Accordingly, many pesticide containers are currently accumulating in temporary storage places throughout the State. The new State regulations on solid waste disposal cover only waste disposal on public lands, and waste disposal on private property (e.g., on-site disposal of industrial wastes) still remains unregulated. Accordingly, some pesticide waste and containers are undoubtedly currently landfilled or buried on private property in different locations throughout the State.

To encourage return of pesticide containers for detoxification/ disposal at a centralized location, the IDEQ recently studied a plan whereby the containers would be plated with tin to increase their value. Working through a youth organization, such as the Future Farmers of America (FAA), the farmers would then be encouraged to return the tin-plated empty containers for cash or credit reimbursement. The containers would then be taken to the city of Ames, Iowa, solid waste-to-energy conversion facility for shredding and subsequent chemical processing (at the same facility or elsewhere) for tin recovery. Vulcan Materials Co., which has a plant in Council Bluffs, Iowa, reportedly has a process for tin recovery involving treatment with a hot alkali solution. The tin-plating approach would have provided incentive for private industry to participate in the program. A detailed investigation of the approach by the State of Iowa, however, indicated the concept was not practical. The IDEQ is currently embarking on a recycling program where the cans will be sold for steel scrap. To encourage farmers to rinse their containers prior to return, an "honesty system" approach whereby the farmers would be required to sign a form stating that the containers are indeed empty and rinsed may be utilized.

VI. DISCUSSION

Table 12 presents a summary of the pertinent features of the 10 landfills studied. The objective of this section is to present an overview of the data collected in connection with the case studies and to highlight similarities and differences between the various sites. Based on the summary data in Table 12 and the detailed discussion in Section V, the following are some generalizations/statements on the 10 landfill sites:

1. Controlled disposal of pesticide wastes in the 10 sites studied is a relatively new operation, with the operating histories ranging from as short as a few months (Case Studies 7 and 8) to a maximum not exceeding 4 to 5 years.
2. Some landfills have been designed and are operated primarily for the disposal of pesticide wastes (Case Studies 1 and 2). In Case Studies 5 and 6, a section within sanitary landfills is fenced-off and used solely for the disposal of pesticide containers. The sites in Case Studies 3 and 4 are general-purpose hazardous waste management facilities accepting a variety of hazardous wastes including pesticide wastes. Landfill sites in Case Studies 7 through 10 are solid waste disposal sites which accept limited quantities of pesticide wastes.
3. Landfill disposal sites are owned and operated by public agencies (Case Studies 1, 3, 5, 6, 7, and 10), private companies (Case Studies 4, 8 and 9) and site users (Case Study 2).
4. In Case Studies 1, 2, 3 and 5, the pesticide disposal sites have been designed and are operated primarily to serve the needs of the local agricultural industry. At some sites (Case Studies 4, 6, 8, 9, and 10), most of the pesticide wastes are from one or two industrial clients.
5. Major impetuses for the establishment of the pesticide disposal sites include serving the waste disposal needs of

CASE STUDY NO. ITEM	1	2	3	4
SITE LOCATION	COALINGA, CA.	NV.	SIMI VALLEY, CA.	OWYHEE CO., ID.
SITE DESCRIPTION	CA. CLASS I SITE MAINLY FOR PESTICIDE CONTAINERS	4 PESTICIDE CONTAINER DISPOSAL SITES	CA. CLASS I SITE WITHIN SANITARY LANDFILL	DEACTIVATED TITAN MISSILE SILOS
SITE START-UP DATE	1973	1971-72	1970	1973
TYPE OF OPERATING AGENCY	CO. DEPT. OF PUBLIC WORKS	FARMERS/FARMER COOPERATIVES	REGIONAL SANITARY DISTRICT	PRIVATE COMPANY
BUSINESS/SERVICE AREA FOR PESTICIDE WASTES	AGRICULTURAL INDUSTRY IN FRESNO AND ADJACENT COUNTIES	LOCAL AGRICULTURAL INDUSTRY	AGRICULTURAL INDUSTRY IN VENTURA AND ADJACENT COUNTIES	2 PESTICIDE MANUFACTURERS IN OREGON AND COLORADO
IMPETUS FOR PESTICIDE DISPOSAL SITE ESTABLISHMENT	PESTICIDE CONTAINER BUILD-UP/IMPROPER DISPOSAL	ILLEGAL DUMP SITE; CHILD POISONING	PESTICIDE CONTAINER BUILD-UP/IMPROPER DISPOSAL	ENVIRONMENTAL PROTECTION; PROFIT POTENTIAL
PERMIT ISSUING AGENCY	STATE REGIONAL WATER QUALITY CONTROL BOARD	STATE DEPT. OF AGRICULTURE; BLM	STATE REGIONAL WATER QUALITY CONTROL BOARD	STATE DEPT. OF ENVIRONMENTAL AND COMMUNITY SERVICES
MAJOR TYPE OF PESTICIDE WASTES; WASTE QUANTITY	CRUSHED AND UNCRUSHED, UNRINSED PESTICIDE CONTAINERS; 5,200 M^3 IN 1973	EMPTY, RINSED PESTICIDE CONTAINERS; NOT AVAILABLE	RINSED PESTICIDE CONTAINERS; 77 T/YR	PESTICIDE MANUFACTURING WASTES 73 - 642 T/MONTH
PESTICIDE WASTE HAULING SERVICE	COMMERCIAL HAULERS/ WASTE GENERATORS	WASTE GENERATORS	COMMERCIAL HAULERS/ WASTE GENERATORS	COMMERCIAL HAULERS/ WASTE GENERATORS
ON-SITE TREATMENT	NONE	CONTAINER CRUSHING; EMPTYING/RINSING IF NEEDED	NONE	ADDITION OF CLAY, WATER AND LIME (IF NEEDED) TO SILOS
WASTE DOCUMENTATION/ RECORD KEEPING	CA. STATE WASTE HAULER RECORD; INSPECTION/ WEIGHING AT GATE	NONE	AGRICULTURAL/INDUSTRIAL EMPTY CONTAINER DISPOSAL PERMIT; INSPECTION/ WEIGHING AT GATE	CERTIFICATE OF WASTE DISPOSAL; RECORD KEPT ON QUANTITY/NATURE OF WASTE
OPERATING/USE SCHEDULE	TWO WEEKS IN FALL; TWO WEEKS IN SPRING	6 - 7 DAYS/YEAR OR BY PRIOR ARRANGEMENT	7:00 A.M. - 4:30 P.M.; MONDAY - FRIDAY	PRIOR ARRANGEMENT
DISPOSAL METHOD	TRENCH METHOD; 51 CM DAILY DIRT COVER; 61 CM FINAL SEASON COVER	EXCAVATED PIT; 45 - 61 CM FINAL SEASON DIRT COVER	AREA METHOD	UNLOADING INTO SILOS; WATER AND CLAY ADDITION
ENVIRONMENTAL CONSIDERATIONS	SITE SELECTED BASED ON ENVIRONMENTAL CONSIDERATION; FENCE ENCLOSURE	SITES SELECTED BASED ON ENVIRONMENTAL CONSIDERATION; FENCE ENCLOSURE	RUNOFF CONTAINMENT; OBSERVATION TEST HOLES	FENCE ENCLOSURE; SILO AIR MONITORING
INCIDENTS OF FIRE, EXPLOSION, ETC.	ONE EXPLOSION IN 1974	NONE	NONE	NONE
CAPITAL COST OF SITE ESTABLISHMENT; SOURCE OF FUNDS	$12,711; COUNTY GENERAL FUNDS	$5,800 - $7,500 PER SITE; 80% ASCS, 20% USERS	$431,000; MEMBER AGENCIES	$55,000 PRIVATE FUND
OPERATING COST; SOURCE OF FUNDS	$5,000 - $10,000 YR; GATE FEE $2.29/$M^3$ AND COUNTY GENERAL FUNDS	$300/YR/SITE; ORIGINAL DEVELOPMENT FUND; NO GATE FEE	$3.30/T OF SOLID WASTE; 1/3 TAX BASE, 2/3 GATE FEE; $2.43/T GATE FEE FOR PESTICIDE CONTAINERS	$6.18 - $7.72/T GATE FEE
SOCIAL PROBLEMS; THEIR MITIGATIONS	NONE	CONTAINERS TAKEN TO SITES DURING NON-BUSINESS HOURS; PUBLIC EDUCATION	FARMERS USING OTHER LANDFILLS; DISCUSSIONS WITH WASTE GENERATORS, EXTENSION OF SITE OPEN DAYS, RELAXATION OF DOCUMENTATION REQUIREMENTS	NONE (EFFECTIVE PUBLIC RELATIONS PROGRAM)
ANTICIPATED SITE LIFE	20 YR	10 YR	7 - 8 YR	10 YR
PLANS FOR FUTURE SITE USE	NONE	NONE	PUBLIC PARK, GOLF COURSE, OR LANDSCAPING FOR ADJACENT DEVELOPMENTS	NONE

TABLE 12. SUMMARY OF PERTINENT FEATURES OF THE 10 LANDFILL SITES

5	6	7	8	9	10
IMPERIAL CO., CA.	PEACH CO., GA.	MS.	ANDREW CO., MO.	DARROW, LA.	POLK CO., IA.
6 CA. CLASS II SITES WITHIN SANITARY LANDFILLS	HAZARDOUS WASTE SECTION WITHIN A SANITARY LANDFILL	CONCRETE CULVERTS IN 17 SANITARY LANDFILLS	PESTICIDE DISPOSAL SECTION IN A SANITARY/ INDUSTRIAL LANDFILL	INDUSTRIAL LANDFILL	REGIONAL SANITARY LANDFILL
1970 (PESTICIDE SECTION: 1972)	BEFORE 1960 (PESTICIDE SECTION: 1972)	(1975: CONCRETE CULVERTS)	1970 (1975: PESTICIDE WASTES)	BEFORE 1966 (1972: ONE PESTICIDE WASTE)	1972
CO. DEPT. OF PUBLIC WORKS	COUNTY/CITY	VARIOUS COUNTIES	PRIVATE COMPANY	PRIVATE COMPANY	QUASI-PUBLIC AGENCY
AGRICULTURAL INDUSTRY IN IMPERIAL COUNTY	ONE LOCAL PESTICIDE FORMULATOR	FARMERS/RESIDENTS IN MS.	ONE LOCAL PESTICIDE FORMULATOR	ONE LOCAL PESTICIDE MANUFACTURER	ONE LOCAL PESTICIDE FORMULATOR
STATE REGULATIONS; CONTAINER BUILD-UP/ IMPROPER DISPOSAL	PROTECTION OF PUBLIC HEALTH; SAFE OPERATION	PROTECTION OF PUBLIC HEALTH	TO REMAIN "FULL SERVICE" DISPOSAL COMPANY	COMPANY'S EXPANSION PROGRAM	REGIONAL DISPOSAL SERVICE
STATE REGIONAL WATER QUALITY CONTROL BOARD	STATE DEPT. OF NATURAL RESOURCES	STATE BOARD OF HEALTH	STATE DEPT. OF NATURAL RESOURCES	STATE DEPT. OF HEALTH	STATE DEPT. OF ENVIRONMENTAL QUALITY
EMPTY, RINSED, AND PUNCTURED PESTICIDE CONTAINERS; 204 - 500 M^3/YR	EMPTY PESTICIDE PAPER BAGS AND CONTAINERS; 41 M^3/MONTH	BANNED CALCIUM ARSENATE; NOT ESTIMATED	OUT-DATED PRODUCTS, CLEAN-UP WASTES; RINSED, AND CRUSHED PESTICIDE CONTAINERS; NOT AVAILABLE	EMPTY PACKAGING MATERIAL CONTAINING 23 KG/MO MALEIC HYDRAZIDE	EMPTY PESTICIDE CONTAINERS; 8 M^3/WEEK
COMMERCIAL HAULERS/ WASTE GENERATORS	WASTE GENERATOR	INDIVIDUAL FARMERS/ RESIDENTS	DISPOSAL COMPANY	DISPOSAL COMPANY	COMMERCIAL HAULERS
NONE	NONE	NONE	NONE	NONE	NONE
RECORD KEPT ON VOLUME OF CONTAINERS ACCEPTED	RECORD KEPT BY THE WASTE GENERATOR	RECORD KEPT AT LANDFILLS	RECORD KEPT BY THE DISPOSAL COMPANY	RECORD KEPT BY THE DISPOSAL COMPANY	RECORD KEPT AT SITE
1 - 2 DAYS/MO. OR BY PRIOR ARRANGEMENT	TWICE/WK	--	PRIOR ARRANGEMENT	MONDAY - SATURDAY	MONDAY - SATURDAY
TRENCH METHOD; 30 - 41 CM DAILY DIRT COVER	TRENCH METHOD; 15 CM IMMEDIATE DIRT COVER	CONCRETE CULVERTS USED	BURIAL; 61 CM IMMEDIATE DIRT COVER	DISPOSAL IN EXCAVATED PITS, WATER SPRAY, DAILY DIRT COVER	TRENCH METHOD; 30 CM DAILY DIRT COVER
FENCE ENCLOSURE	FENCE ENCLOSURE	COVER AND LOCK FOR CULVERTS	OBSERVATION WELLS; RUNOFF DIVERSION	FENCE ENCLOSURE; ENVIRONMENTAL SAMPLING	MOVABLE LITTER FENCE; RUNOFF DIVERSION; MONITORING WELLS
SEVERAL SMALL FIRES	NONE	NONE	NONE	NONE	NONE
\$4, 500 FOR 6 SITES; COUNTY AND MUNICIPALITIES	\$3,000 - \$4,000; THE SITE USER	COUNTIES AND MUNICIPALITIES	NOT DISCLOSED; PRIVATE FUNDS	NOT DISCLOSED; PRIVATE FUNDS	REVENUE BONDS
\$5,000/YR. FOR 6 SITES; COUNTY AND MUNICIPALITIES; NO GATE FEE	COUNTY/CITY	COUNTIES AND MUNICIPALITIES	NOT DISCLOSED; DISPOSAL FEE	NOT DISCLOSED; HAULING/DISPOSAL FEE	\$0.98/M^3 DISPOSAL FEE
NONE	LOCAL CONCERN WHEN HAZARDOUS SIGNS INSTALLED; EXPLANATION BY STATE	RELUCTANCE OF SITE OPERATORS TO INSTALL CULVERTS; EXPLANATION BY STATE	SOME INQUIRIES ON SITE OPERATION; ASSURANCE BY STATE	SUSPECTED INVOLVEMENT IN HCB -CONTAMINATION EPISODE; CLEAN-UP OPERATION	INITIAL PUBLIC OPPOSITION TO SITE LOCATION; COURT ACTION
20 - 50 YR	25 YR	WASTES TO BE TRANSFERRED TO MORE PERMANENT DISPOSAL SITES	NOT ESTIMATED	20 YR	7 - 8 YR
NONE	NONE	-	NONE	NONE	GOLF COURSE

the local agricultural industry, compliance with state regulations, protection of public health and safety of the landfill operator and equipment, and opportunity for a profitable business.

6. Operation of a site generally requires some form of permit and approval from one or more state agencies. Permit regulations and approval conditions vary from state to state.

7. The type and quantity of pesticide wastes handled vary among different disposal sites. In Case Study 4, most of the wastes are process wastes from the manufacturing of pesticides. In some sites (Case Studies 1, 2, 5 and 6) pesticide wastes are primarily empty containers. In Case Study 7, the concrete culverts installed in sanitary landfills are for the disposal of limited quantities of calcium arsenate which is no longer used on cotton crops.

8. In most cases there are certain regulations and requirements governing the type of pesticide wastes which can be accepted at the landfill site. All types of pesticide wastes (manufacturing wastes, rinsed and unrinsed containers, outdated products, etc.) can be accepted at the disposal facility in Case Study 4. Only empty and triple-rinsed pesticide containers are to be accepted at sites in Case Studies 2 and 5. To qualify for a lower disposal fee, pesticide containers taken to the site in Case Study 3 must be empty and rinsed. The requirement for rinsing of pesticide containers is very difficult to enforce and containers received at the disposal sites are not always rinsed. Even though under California disposal site classification, Class II-1 disposal sites are suitable for the disposal of triple-rinsed pesticide containers, some California Class II-1 sites no longer accept pesticide containers, since it cannot be guaranteed that the containers received at the sites are always rinsed.

9. Hauling of the waste to the site includes use of commercial haulers (Case Studies 1, 3, 4, 5, and 10), company disposal trucks (Case Studies 8 and 9) and private vehicles (Case Studies 2 and 6).

10. There are no on-site pre-disposal waste treatments at eight of the 10 sites studied. On-site waste treatment in Case Study 2 consists of container crushing and emptying and rinsing of containers, if necessary. Clay and water are added to the waste disposal silos in Case Study 4 to absorb the impact of the dropping loads, to suppress odor, and to reduce possibilities for explosion and fire.

11. The procedures and requirements for waste documentation vary from site to site. Some sites use an elaborate procedure for waste documentation and keep a detailed record on the quantity and type of wastes handled. In some cases (e.g., Case Study 1) copies of the Waste Hauler Record must also be submitted to the state. In Case Studies 4, 8 and 9, the disposal companies operating the sites keep records of the type and quantity of pesticide waste handled; upon request, these records would be available to the state for review.

12. The operating schedule varies among different sites. Some sites (Case Studies 1, 2, 4, 5, and 6) are open only during certain specified days in a month or in a year or by prior appointment. To encourage farmers to bring in their containers for disposal, in Case Study 3, the schedule for accepting pesticide containers has been extended from one day per week to five days per week.

13. With the exception of Case Studies 4 and 7 which represent unique disposal conditions, the disposal operation at the landfill sites generally use either the trench (pit) or area method of landfilling. The deposited wastes are covered with dirt layers immediately, after each day of operation, and/or when the site is closed for the season.

14. In some cases (notably Case Studies 1 and 4) detailed environmental studies and preparation of environmental impact statements have preceded the actual site selection and operation. Observation wells and sampling and analysis of air, water, and land are used in a number of cases for environmental monitoring. In most cases, the pesticide disposal operating area is fenced off and is kept locked when not in use.

15. Only in two cases (1 and 5) have there been incidents of fire and explosion.

16. Capital cost varies widely for different sites, reflecting differences in the size of the operation and site location. Source of the capital funds have been Federal support (Case Study 2), public (Case Studies 1, 3, 5, 6, and 7), private (Case Studies 4, 8, and 9), assessment to users (Case Study 2), and revenue bonds (Case Study 10).

17. Operating costs and revenues vary widely reflecting differences in the size of the operation, labor cost, local and state regulations, and geographic location. In some cases (Case Studies 5, 6, and 7) cost for the disposal of pesticide wastes is absorbed in the overall cost of solid waste disposal; no gate fees are charged at these sites to encourage the waste generators to bring their pesticide wastes in for proper disposal. The operating revenue in Case Studies 1, 3, 4, 5, 8, 9, and 10 is derived wholly or in part from the gate fee .

18. The establishment and operation of certain landfills have generally been well accepted by the area residents. In a number of cases, there has been some public complaint and objection and in one case (Case Study 10) citizens' objections to the specific location proposed for the site were taken all the way to the State Supreme Court prior to final resolution. A few problems which have been

encountered in the operation of some of the landfills include waste generators taking the waste to the site during non-business hours (Case Study 2) and use of other landfills for reasons of economics and convenience (Case Study 3). In Case Study 2, the problem is being resolved through public education; in Case Study 3, the problem has been mostly resolved by extending the business hours, lowering the disposal fee, and modifying the waste documentation requirements. To guard against disposal of pesticide containers at unauthorized locations, in Imperial County, California, (Case Study 5), the pesticide containers are marked, for identification purposes, with the pesticide dealer's license number and the number of Imperial County permit to apply pesticides.

19. The anticipated site life is dependent on the size of the land parcel and the estimated volume of business; for the cases studied, the estimated life varies from 7 to 50 years.

20. No definite plans have been formulated for future use of most of the sites studies. Plans considered in Case Studies 3 and 10 include use as a golf course (Case Study 10), and development of a public park or landscaping for adjacent commercial/industrial development (Case Study 3).

21. In the majority of the cases studied and in a number of additional cases which were initially reviewed for inclusion in this study, the site operators and public agencies which oversee the operation of certain sites, indicated that they routinely receive inquiries and requests for permission to dispose of wastes from waste generators located outside their normal service areas. These waste generators have no access to other sites or to other acceptable means of waste disposal. In one instance (Case Study 2), a waste generator offered to pay $1.00 for the disposal of each pesticide container.

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VIII. APPENDICES

APPENDIX A

ABBREVIATIONS FOR UNITS OF WEIGHT AND MEASURE

The following abbreviations for units of weight and measure which are based on the system adopted by the National Bureau of Standards[12] have been used in this report.

Unit	Abbreviation
acre	acre
centimeter	cm
cubic foot	ft^3
cubic meter	m^3
cubic yard	yd^3
foot	ft
gallon	gal
hectare	ha
inch	in.
kilogram	kg
kilometer	km
liter	liter
meter	m
metric ton	t
mile	mi
pound	lb
square foot	ft^2
square kilometer	km^2
square mile	mi^2
ton	ton

APPENDIX B

CALIFORNIA DISPOSAL SITE AND WASTE CLASSIFICATION SYSTEMS[6]

On March 2, 1972, the State Water Resources Control Board adopted Subchapter 15 as an addition to Chapter 3 in Title 23 of the California Administrative Code. This new Subchapter governs waste disposal to land and establishes a disposal site and waste classification system on a statewide basis. The classification of disposal sites is based upon the geologic and hydrologic features of the disposal area and the capability for protection of surface and groundwater quality. The categorization of wastes is based upon the threat that the type of waste material presents to water quality. These additions to the Administrative Code were made pursuant to an amendment to Water Code Section 14040 made during the 1970 legislative session instructing the regional water quality control boards to approve sites suitable for disposal of wastes "consistent with the classification that shall be adopted by the State Board".

Disposal Site Classifications

Class I - There must be no possibility of discharge of pollutant substances to usable waters. Artificial barriers may be used for control of lateral waste movement only. Usable groundwater may underlie the site, but only under extreme cases and where natural geological conditions prevent movement of the wastes to the water and provide protection for the active life of the site. Inundation and washout must not occur. All waste groups may be received.

Limited Class I - A special case of Class I site is established where a threat of inundation by greater than a 100-year flood exists. A limitation is placed on the type and amount of Group 1 wastes that may be accepted.

Class II-1 - These sites may overlie or may be adjacent to usable groundwater. Artificial barriers may be used for both vertical and lateral waste confinement in the absence of natural conditions. Protection from a 100-year frequency flood must be provided. Group 2 and 3 wastes can be accepted and under special conditions, certain Group 1 materials may be accepted.

Class II-2 - These sites may have vertical and lateral continuity with usable groundwater, but have features that provide protection of water quality. Group 2 and 3 wastes can be accepted.

Class III - These are sites where Group 3 wastes would be dumped directly into ground or surface water, or where there is inadequate protection to water quality. Only Group 3 wastes may be accepted.

Classification of Wastes Discharged to Land

Group 1 Wastes - Group 1 wastes consist of or contain toxic substances and substances which could significantly impair the quality of usable waters. In the agricultural waste category, examples of Group 1 wastes include: chemicals such as pesticides or chemical fertilizers; discarded containers of chemicals unless adequately cleansed.

Group 2 Wastes - Group 2 wastes consist of or contain chemically or biologically decomposable material which does not include toxic substances nor those capable of significantly impairing the quality of usable waters. In the agricultural waste category, examples of Group 2 wastes include:(a) plant residues from the production of crops including, but not limited to, stalks, vines, green drops, culls, stubble, hulls, lint, seed, roots, stumps, prunings, and trimmings, and (b) adequately cleansed pesticide containers.

To be adequately cleansed, the pesticide containers should meet the following conditions:

a. Metal, plastic and glass containers used for liquids shall have been processed by rinsing and draining or by other decontamination techniques. The processing procedure shall include or be equivalent to at least triple rinsing and thorough draining of the containers. Rinse waters produced shall be placed in the spray tank or disposed of in accordance with requirements of the regional board. To ensure that the containers have been cleansed as directed, the County Agricultural Commissioner must certify to the regional board that such programs exist and are utilized by pesticide users in the County.

b. Paper or plastic sacks and bags used for pesticide dusts and wettable powders which are empty are suitable for disposal as Group 2 wastes in Class II-2 sites which are protected from flooding and where the depth to groundwater is greater than 10 feet.

For public health and safety reasons, the local health officer or agricultural commissioner may permit the pesticide containers used for liquids, dusts and powders to be disposed of only at supervised disposal sites or under supervised conditions.

Group 3 Wastes - Group 3 wastes consist entirely of non-water soluble, nondecomposable inert solids; examples include but are not limited to the following: construction and demolition wastes (earth, rock, concrete, etc.), vehicle tires, inert industrial wastes (glass, inert tailings, etc.).

APPENDIX C
(FOR CASE STUDY NO. 1)

1. Hazardous Waste Disposal Summary report submitted to the State for the fall 1974 operation.
2. Partial listing of hazardous materials or material containers received during the fall 1974 operation.
3. A blank copy of the California Liquid Waste Hauler Record.

FRESNO COUNTY

DEPARTMENT OF PUBLIC WORKS
4499 E. KINGS CANYON ROAD FRESNO, CALIFORNIA 93702

CLINTON D. BEERY
DIRECTOR OF PUBLIC WORKS

HENRY CHIN
ASS'T DIRECTOR (HIGHWAYS)

WALTER N. CLARK
ASS'T DIRECTOR (DEVELOPMENT SERVICES)

November 14, 1974

RE: Hazardous Material
Disposal Summary

California State Department of Health
Vector Control Section
714 P Street
Sacramento, California 95814

Gentlemen:

Fresno County opened its Class I Pesticide Container Disposal Site near Coalinga for a 10 day period between October 21 and November 1, 1974. The majority of material received was various empty pesticide containers, however, some partially full and full containers were received. There was also some contaminated seed, diluted pesticide residue and zinc sludge received at the site. The following is a general summary of material received:

6600 c.y. of various pesticide containers
198 tons of zinc sludge waste
17 tons of diluted pesticide residue
31 c.y. of mercury contaminated seed

It was extremely difficult to identify the material which had been contained in the containers, because many labels were missing and some containers had been stored for years. Attached is a summary of some hazardous materials or containers for these materials which were received at the site. Also under separate cover is a copy of all manifests received.

It is interesting to note that 42% of the material received was generated outside of Fresno County. Material was received from the following California communities outside of the County:

Arvin
Atwater
Bakersfield
Buttonwillow
Chowchilla
Corcoran
Courtland
Delano
Dos Palos
Edison
Emeryville
Exeter
Hanford
Hughson
Ivanhoe
Lathrop
Lemoore
Linden
Lindsay
Los Banos
Madera
Modesto
Oildale
Porterville
Sacramento
Shafter
Snelling
Terra Bella
Tipton
Tulare
Visalia
Woodland
Woodlake

The total State fee was $930.25, which was based on the attached schedules for crushed and uncrushed containers. For materials other than containers, the $0.60 per ton State fee was collected, based on an estimated weight of the material. Since many customers charged the fee to their account, all fees have not yet been collected. Submitted is $204.75 which is the total

California State Department of Health
Page 2
November 14, 1974

State fee collected to date. The balance of $725.50 will be submitted upon collection.

Very truly yours,

Clinton D. Beery
Director of Public Works

K. D. Swarts
K. D. Swarts
Asst. Maintenance Engineer

KDS/ms
Attachment

FRESNO COUNTY

DEPARTMENT OF PUBLIC WORKS
4499 E. KINGS CANYON ROAD FRESNO, CALIFORNIA 93702

CLINTON D. BEERY
DIRECTOR OF PUBLIC WORKS

HENRY CHIN
ASS'T DIRECTOR (HIGHWAYS)

WALTER N. CLARK
ASS'T DIRECTOR (DEVELOPMENT SERVICES)

SUMMARY OF HAZARDOUS MATERIALS or MATERIAL CONTAINERS RECEIVED

Gam Kil 25
Caposil Zinc
Tamorin (Rat poison)
Black Leaf DDT
Methoxychlor
Diazinon
Copper Sulfate
Destruxol
Endothol
Stop Grow
Toxophene
Puratized
Cygon 267
Capton
B H C 12-W
Chlordane
Tungusol
Diamonimum Phosphate
Detox 50
Lorox
Tuperson
X All
Treflan
Dymid
Keykote
Adjurvant 401
Dieldrin
Isotox
Sulpher
Batano
Agri Mycin 17
Paraquot
Malathion
Thimet
Abate 50% W P
Thimet Zinophos 7.5%
Lasso E C
Vegedex EC
Tox DDT 4-2 Emul.
Tox 8 Emul.
Trinao 2-2 EC
Trinao 2-3 EC
Black Gold

KDS/ms

Revised December 1974

CALIFORNIA LIQUID WASTE HAULER RECORD

☐☐☐☐☐☐☐☐☐

STATE WATER RESOURCES CONTROL BOARD
STATE DEPARTMENT OF HEALTH

PRODUCER OF WASTE (Must be filled by producer)

Name (print or type): ____________________ ☐☐☐☐☐ Code No.

Pick up Address: ____________________
(Number) (Street) (City)

Telephone Number: (   ) __________ P.O. or Contract No.: __________

Order Placed By: ____________________ Date: __________

Type of Process which Produced Wastes: ____________________ ☐☐☐☐
(Examples: metal plating, equipment cleaning, oil drilling-- Code No.
wastewater treatment, pickling bath, petroleum refining)

DESCRIPTION OF WASTE (Must be filled by producer)

Check type of wastes:

1. ☐ Acid solution
2. ☐ Alkaline solution
3. ☐ Pesticides
4. ☐ Paint sludge
5. ☐ Solvent
6. ☐ Tetraethyl lead sludge
7. ☐ Chemical toilet wastes
8. ☐ Tank bottom sediment
9. ☐ Oil
10. ☐ Drilling mud
11. ☐ Contaminated soil and sand
12. ☐ Cannery waste
13. ☐ Latex waste
14. ☐ Mud and water
15. ☐ Brine

☐ Other (Specify) ____________________ ☐☐☐ Code No.

Components:
(Examples: Hydrochloric acid, lime, caustic soda, phenolics, solvents (list), metals (list), organics (list), cyanide)

Components	Upper	Lower	%	ppm
1. ________	___	___	☐	☐
2. ________	___	___	☐	☐
3. ________	___	___	☐	☐
4. ________	___	___	☐	☐
5. ________	___	___	☐	☐
6. ________	___	___	☐	☐

Concentration: Upper, Lower, %, ppm

Hazardous Properties of Waste:
pH ______ ☐ none ☐ toxic ☐ flammable ☐ corrosive ☐ explosive

Bulk Volume: __________ ☐ gal ☐ tons ☐ barrels (42 gal) ☐ other ______ (specify)

Containers: ______ (Number) ☐ drums ☐ cartons ☐ bags ☐ other ______ (specify)

Physical State: ☐ solid ☐ liquid ☐ sludge ☐ other ______ (specify)

Special Handling Instructions (if any): ____________________

The waste is described to the best of my ability and it was delivered to a licensed liquid waste hauler (if applicable).

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

____
Signature of authorized agent and title

HAULER OF WASTE (Must be filled by hauler)

Name (print or type): ____________________ ☐☐☐ Code No.

Business Address: ____________________
(Number) (Street) (City)

Telephone Number: (   ) __________ Pick Up: __________ (Date) Time: __:__ ☐ am ☐ pm

State Liquid Waste Hauler's Registration No. (if applicable): __________

Job No.: __________ No. of Loads or Trips: __________ Unit No.: __________

Vehicle: ☐ vacuum truck ____ barrels, ☐ flatbed, ☐ other __________ (specify)

The described waste was hauled by me to the disposal facility named below and was accepted.

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

____
Signature of authorized agent and title

DISPOSER OF WASTE (Must be filled by disposer)

Name (print or type): ____________________ ☐☐☐ Code No.

Site Address: ____________________

The hauler above delivered the described waste to this disposal facility and it was an acceptable material under the terms of RWQCB requirements, State Department of Health regulations, and local restrictions.

Quantity measured at site (if applicable): __________ State fee (if any): ______

Handling Method(s):

☐ recovery

☐ treatment (specify): ____________________ ☐☐
(Examples: incineration, neutralization, precipitation)-Code No.

☐ disposal (specify): ☐ pond ☐ spreading ☐ landfill ☐ injection well
☐ other (specify): ____________________ ☐☐ Code No.

If waste is held for disposal elsewhere specify final location: __________

Disposal Date: __________

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

____
Signature of authorized agent and title

The site operator shall submit a legible copy of each completed Record to the State Department of Health with monthly fee reports.

FOR INFORMATION RELATED TO SPILLS OR OTHER EMERGENCIES INVOLVING HAZARDOUS WASTE OR OTHER MATERIALS CALL (800) 424-9300.

DOT Proper Shipping Name ____________________

APPENDIX D
(FOR CASE STUDY NO. 3)

VENTURA REGIONAL COUNTY SANITATION DISTRICT CLASS I WASTE DISPOSAL INFORMATION

VENTURA REGIONAL COUNTY SANITATION DISTRICT

CLASS I WASTE DISPOSAL INFORMATION

The Regional District operates a Class I sanitary landfill in Simi Valley. Group I wastes may be accepted under rigidly controlled conditions. Liquid wastes, regardless of grouping, and all hazardous wastes require the filing of a California Liquid Waste Hauler's Record (Rev. 12/74) prior to acceptance. District permits are also required under certain conditions.

DEFINITIONS

Group I wastes consist of or contain toxic substances which could significantly impair the quality of usable waters. Examples are:

paint sludges
chemical fertilizers
saline fluids
chemicals
cleaning fluids
acids & alkalis
spent washing fluids
pesticides
metallic compounds

"Toxic" means lethal, injurious, or damaging to man or other living organisms including plants, domestic animals, fish and wildlife.

PROCEDURES

Permits are issued for disposal of all hazardous wastes. Two types are used: agricultural and industrial. The first allows disposal of miscellaneous, low-risk, empty pesticide cans; the second, full pesticide containers and all types of hazardous wastes. Procedures are:

Agricultural: Empty pesticide and herbicide bags and containers, except extremely toxic and water-reactive chemicals, are included. Before this material can be brought to the site, the hauler must complete an "Empty Container Disposal Permit" in duplicate. This permit, when validated, allows the hauler "blanket" usage for a period of one year. A $10 annual fee is charged for review and administration. These procedures can also be used for disposal of certain industry-generated empty chemical containers.

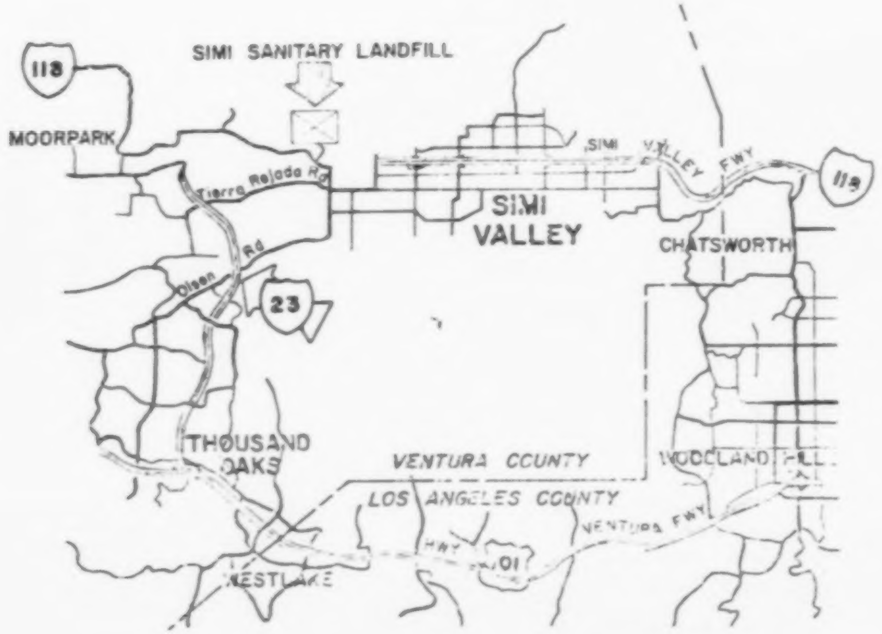
Industrial: All liquids, hazardous wastes, and full pesticide containers fall under this category. The California Liquid Waste Hauler's Record must be fully completed each time by the hauler and producer. District permits are required for all materials except sewage sludge. Procedures are:

(1) Hauler completes application form in triplicate, giving complete description of material to be disposed of, quantities involved, and submits with $25 fee.
(2) Within three days, District will respond indicating action needed. Typically, this could be: approval to haul waste to site, a request for additional fees, request for disposal plan. If unusual wastes are involved, samples may be required and a consultant retained to make analysis and recommendations; applicant is responsible for all costs.
(3) District will issue a permit after appropriate fees have been paid. The same permit can be used continually if waste is unchanged, but a new Liquid Waste Hauler's Record is needed every time; hauler should notify site 24 hours in advance by calling (805) 522-1116.

7/21/75

(4) Hauler will present Permit and Liquid Waste Hauler's Record at gate. Fee to be paid in cash unless prior credit arrangements are made. Credit application forms are available upon request.
(5) Weighmaster will check permit against load. Any materials not conforming will be rejected. All drums, boxes, or other packaging must be clearly labeled and match the inventory record exactly. Liquids in tank trucks and barrels may be checked for odor, temperature, flammability, and pH.
(6) District personnel will direct hauler to disposal area. Hauler shall comply with applicable federal, state, and industry safety regulations, and shall be responsible for safe unloading.

The attached forms are samples; extra forms are available from the District upon request by calling (805) 648-2717.


118
SIMI SANITARY LANDFILL
MOORPARK
Tierra Rejada Rd
SIMI VALLEY FWY
118
SIMI
VALLEY
CHATSWORTH
Olsen Rd
23
THOUSAND
OAKS
VENTURA COUNTY
LOS ANGELES COUNTY
WOODLAND HILL
VENTURA FWY
HWY 101
WESTLAKE

PERMIT NO. ___________
DATE ISSUED ___________

VENTURA REGIONAL COUNTY SANITATION DISTRICT

AGRICULTURAL/INDUSTRIAL
EMPTY CONTAINER DISPOSAL PERMIT

(Not Transferable)

NAME OF HAULER ____

FIRM OR AGENCY ______________________________ PHONE ______________

ADDRESS ______________________________ CITY ______________ ZIP CODE ___________

DESCRIPTION OF MATERIALS TO BE DISPOSED OF:
(Attach additional sheets if necessary)

____

____

____

SPECIAL INSTRUCTIONS FOR HANDLING ______________________________

I hereby certify that the information provided above is complete, true, and correct to the best of my knowledge. I agree to indemnify and hold harmless the Ventura Regional County Sanitation District and their agents and employees from and against all claims, damages, losses, and expenses, including attorneys' fees arising out of or resulting from the unloading of and placing of the described waste in the disposal area. I further agree to abide by all the conditions of this permit and adhere to the rules and regulations of the District.

SIGNATURE OF APPLICANT ______________________ DATE ___________

DO NOT WRITE BELOW THIS LINE
(TO BE FILLED OUT BY VRCSD)

This permit allows the applicant to dispose of only the materials described above. The District can, at any time, add or eliminate any or all conditions and withdraw the permit completely with 10 days' notice. $10.00 application fee for each calendar year is non-refundable.

SPECIAL CONDITIONS: ____

______________________________ FACILITY TO BE USED: ______________

VENTURA REGIONAL COUNTY SANITATION DISTRICT

BY ______________________ DATE ___________

VRCSD-212
6-24-75

VENTURA REGIONAL COUNTY SANITATION DISTRICT

Permit No. ________________
(By District)

APPLICATION FOR INDUSTRIAL WASTE DISPOSAL

(Type or Print)

No. of Containers	Wt. or Volume	DESCRIPTION OF MATERIAL

(Please also complete reverse)

PRODUCER OF INDUSTRIAL WASTE

Name____ Phone No. ________________

Pick up Address ____

Street City Zip Code

Type of Process
Which Produced Wastes ____

(examples: metal plating, equipment cleaning, chemical formulation, etc.)

____

I certify that the described waste was delivered to the hauler named below for legal disposal at the site indicated.

Date________________ ________________________________

Signature of Producer or Authorized Agent, and Title

HAULER

Name____ Phone No. ________________

Business Address ____

Street City Zip Code

I certify that the described waste was hauled by me to the disposal facility named below and was accepted. I further agree to indemnify and hold harmless the Ventura Regional County Sanitation District, and their agents and employees from and against all claims, damages, losses and expenses, including attorneys' fees arising out of or resulting from the unloading of and placing of the described waste in the disposal area; except where such claims, damage, losses and expenses are caused solely by the negligent or wrongful acts of district or its agents other than the negligent omission or commission of district in connection with the general supervision or direction of unloading.

Truck
License No. ________________ ____________________________

Signature of Hauler

Date: ________________

DISPOSAL FACILITY

I certify that the hauler above delivered the described waste(s) to this disposal facility and it was an acceptable material under the terms of the Industrial Waste Disposal Permit.

Site Location____________________________

Date________________ ________________________________

Signature of Waste Disposal Facility Operator

Time A. M.
________________ P. M.

5/21/73

VENTURA REGIONAL COUNTY SANITATION DISTRICT

CLASS I WASTE DISPOSAL INFORMATION

PROCEDURES & RATES - AGRICULTURAL & INDUSTRIAL

Type of Waste	California Liquid Waste Hauler's Record Required	Disposal Plan Required	Disposal Permit Required	Disposal Permit Fee	Disposal Fee	Disposal Schedule	Special Services
Low Risk*	No	No	Yes	$10.00/yr	$2.20/ton	Daily 8:00-4:30 Mon - Fri	----
Sewage Sludge: Member Agencies Private Sources	Yes, for each delivery	No No	No No	No No	$3.63/ton $7.25/ton		----
Toxic**	Yes, for each delivery	Yes	Yes	$25.00 /type	$7.70/ton +State Fees		Cost of any consulting service and/or testing required for unusual wastes

*Low Risk includes: Empty (triple rinsed) pesticide and herbicide containers, and empty chemical containers.

**Toxic includes: Materials lethal, injurious or damaging to man or other living organisms including plants, domestic animals, fish and wildlife.

7/21/75

VENTURA REGIONAL COUNTY SANITATION DISTRICT

FEE SCHEDULE

PLAN CHECKING FEES

If the total valuation of the proposed work, as determined by the Chief Engineer-General Manager, is $2,000.00 or less, the plan checking fee will be $50.00.

For each $100.00 or fractional part thereof, of the total valuation of the proposed work in excess of $2,000.00, and not exceeding $10,000.00, an additional $2.00.

For each $100.00 or fractional part thereof, of the total valuation of the proposed work in excess of $10,000.00, an additional $1.50.

If there is an increase in the valuation of the work after the plans have been submitted and the fee paid, the applicant shall pay a supplemental checking fee based on the additional valuation of the proposed work.

The minimum supplemental checking fee will be $20.00.

FEES FOR PREPARING OR CHECKING SPECIAL STUDIES

Before proceeding with special studies, the Chief Engineer-General Manager shall collect from the person making the request for the work a fee in the amount of the estimated cost of doing the work, as determined by the Chief Engineer-General Manager, but not less than $100.00. If, after the fee is paid, a change in the study is requested which will increase the cost of doing the work, a supplemental fee shall be collected in the amount of the estimated additional work.

Studies prepared by others and submitted for checking by the VRCSD shall be subject to the fee requirements stated above, except that the minimum fee shall be $50.00. However, there shall be no additional fee collected for the checking of a study required in connection with plan checking for which a fee has been paid.

MISCELLANEOUS

Industrial Waste Disposal Application	$25.00
Outside Consultant	Actual Cost
Chemical Analysis	Actual Cost
Special excavations at Sanitary Landfills	$32.00 per hour (1/2 hr. min.)
Authorized Travel	$ 0.11 per mile
Printing and Blueprinting	Cost + 10%
Telephone	Actual Cost

Cost of furnishing personnel services shall be at the current rates on file in the office of the Clerk of the Regional District.

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